ICOM®

SERVICE MANUAL

UHF TRANSCEIVERS

IC-F21 series
IC-F22 series

Icom Inc.

INTRODUCTION

This service manual describes the latest service information for the **IC-F21/IC-F21S/IC-F21BR/IC-F21GM/IC-F22/IC-F22S/IC-F22SR** at the time of publication.

To upgrade quality, all electrical or mechanical parts and internal circuits are subject to change without notice or obligation.

DANGER

NEVER connect the transceiver to an AC outlet or to a DC power supply that uses more than 8.6 V. Such a connection could cause a fire hazard and/or electric shock.

DO NOT expose the transceiver to rain, snow or any liquids.

DO NOT reverse the polarities of the power supply when connecting the transceiver.

DO NOT apply an RF signal of more than 20 dBm (100mW) to the antenna connector. This could damage the transceiver's front end.

ORDERING PARTS

Be sure to include the following four points when ordering replacement parts:

1. 10-digit order numbers
2. Component part number and name
3. Equipment model name and unit name
4. Quantity required

<**SAMPLE ORDER**>

1130007020 S.IC	TC7S66FU	IC-F21	MAIN UNIT	1 piece
8810004860 Screw	PH M 2 x 6 ZK	IC-F21	Chassis	10 pieces

Addresses are provided on the inside back cover for your convenience.

IC-F21/IC-F21GM/
IC-F22/IC-F22SR

IC-F21S/IC-F21BR/
IC-F22S

REPAIR NOTES

1. Make sure a problem is internal before disassembling the transceiver.
2. **DO NOT** open the transceiver until the transceiver is disconnected from its power source.
3. **DO NOT** force any of the variable components. Turn them slowly and smoothly.
4. **DO NOT** short any circuits or electronic parts. An insulated turning tool **MUST** be used for all adjustments.
5. **DO NOT** keep power ON for a long time when the transceiver is defective.
6. **DO NOT** transmit power into a signal generator or a sweep generator.
7. **ALWAYS** connect a 40 dB to 50 dB attenuator between the transceiver and a deviation meter or spectrum analyzer when using such test equipment.
8. **READ** the instructions of test equipment thoroughly before connecting equipment to the transceiver.

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SECTION 1 SPECIFICATIONS

				EIA-152-C/204D or TIA-603	ETS 300 086/300 296
GENERAL	Frequency coverage			440.000 MHz–470.000 MHz 462.550 MHz–469.550 MHz Ⓐ 462.550 MHz–467.725 MHz Ⓑ	440.000 MHz–470.000 MHz 446.00625 MHz–446.09375 MHz Ⓒ
	Type of emission			16K0F3E/8K50F3E (at 25 / 12.5 kHz: W/N-type), 8K50F3E (at 12.5 kHz: N-type)	
	Number of channels			2 ch. (IC-F21BR / F21S / F22S), 15 ch. (IC-F21GM / F22SR), 16 ch. (IC-F21 / F22)	
	Power supply requirement			7.2 V (negative ground)	
	Antenna impedance			50 Ω normal	
	Input impedance (Mic)			2.2 kΩ normal	
	Output impedance (Audio)			8 Ω normal	
	Intermediate frequency			1st: 46.350 MHz, 2nd: 450 kHz	
	Operating temperature range			–30 ˚C to +60 ˚C (–22˚F to +140˚F)	–25 ˚C to +55 ˚C (–13˚F to +131˚F)
	Current drain (at 7.2 V)	Tx	High power	1.6 A (4 W) except Ⓐ, Ⓒ; 1.2 A (2 W) except Ⓒ; 0.5 A (0.5 W ERP) Ⓒ only	
			Low power	0.8 A (1 W)	
		Rx	stand-by	70 mA	
			Rated audio	250 mA	
	Dimensions (Projections not included)			54(W) × 128(H) × 37(D) mm; 2⅛(W) × 5 1/25(H) × 1 15/32(D) inch	
	Weight			310 g; 10.1 oz (with BP-209), 300 g; 10.6 oz (with BP-222)	
TRANSMITTER	RF output power (at 7.2 V DC)			High: 4.0 W (Ⓐ: 2.0 W, Ⓒ: 0.5 W), Low1: 2.0 W (except Ⓐ, Ⓒ), low2: 1.0 W (except Ⓒ)	
	Modulation system			Variable reactance frequency modulation	
	Max. permissible deviation			± 5.0 kHz (25 kHz), ± 2.5 kHz (12.5 kHz) (Ⓒ: ± 2.5 kHz (12.5 kHz) only)	
	External mic.connector			3-conductor 2.5 mm (1/10 in) (2 kΩ)	
	Frequency error			±2.5 ppm	±1.5 kHz
	Spurious emissions			73 dBc (typical)	0.25 µW <= 1 GHz, 1.00 µW > 1 GHz
	Adjacent channel power			70 dB*1 (25 kHz), 60 dB*1 (12.5 kHz)	
	Audio harmonics distortion			3 % typical at 1 kHz, 40 % deviation	5 % typical at 1 kHz 60 % deviation
	FM Hum and noise			46 dB typ. (25 kHz), 40 dB typ. (12.5 kHz)	–
	Residual modulation			–	45 dB typ. (25 kHz), 43 dB typ. (12.5 kHz)
	Limiting charact of modulator			70 % – 100 % of max. deviation	
RECEIVER	Receive system			Double-conversion super heterodyne	
	Intermediate frequencies			1st: 46.350 MHz, 2nd: 450 kHz	
	Sensitivity			0.25 µV (typical) for 12 dB SINAD	0.25 µV (typical) for 12 dB SINAD 0.63 µV EMF (typical) for 20 dB SINAD (Ⓒ: 26.5 dBµV/m for 20 dB SINAD)
	Audio output power (at 7.2 V)			0.5 W at 5 % distortion with an 8 Ω load, 0.6 W at 5 % distortion with 6 Ω load	
	Adjacent channel selectivity			70 dB typ. (25 kHz), 65 dB typ. (12.5 kHz)	70 dB (25 kHz), 60 dB (12.5 kHz) 81.29 dBµV/m
	Spurious response			70 dB*1 (Ⓒ: 91.29 dBµV/m)	
	Intermodulation			70 dB	65 dB (Ⓒ: 86.29 dBµV/m)
	FM Hum and noise (Typical)			46 dB*2 (25 kHz), 40 dB*2 (12.5 kHz)	45 dB typ.*3 (25 kHz), 43 dB typ.*3 (12.5 kHz)
	Squelch sensitivity			0.3 µV typical at threshold (Ⓒ: 26.5 dBµV/m at threshold)	

*1EIA-152-C/204D or TIA-603 is typical value, *2EIA-152-C/204D only, *3With CCITT filter

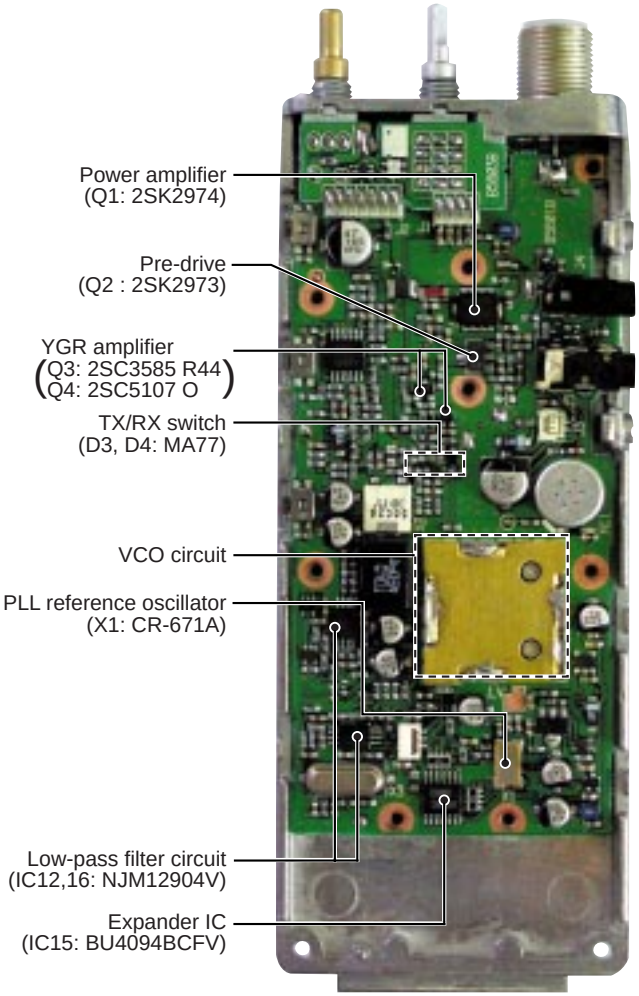
Ⓐ: [F21BR], Ⓑ: [F21GM]], Ⓒ: [F22SR]

All stated specifications are subject to change without notice or obligation.

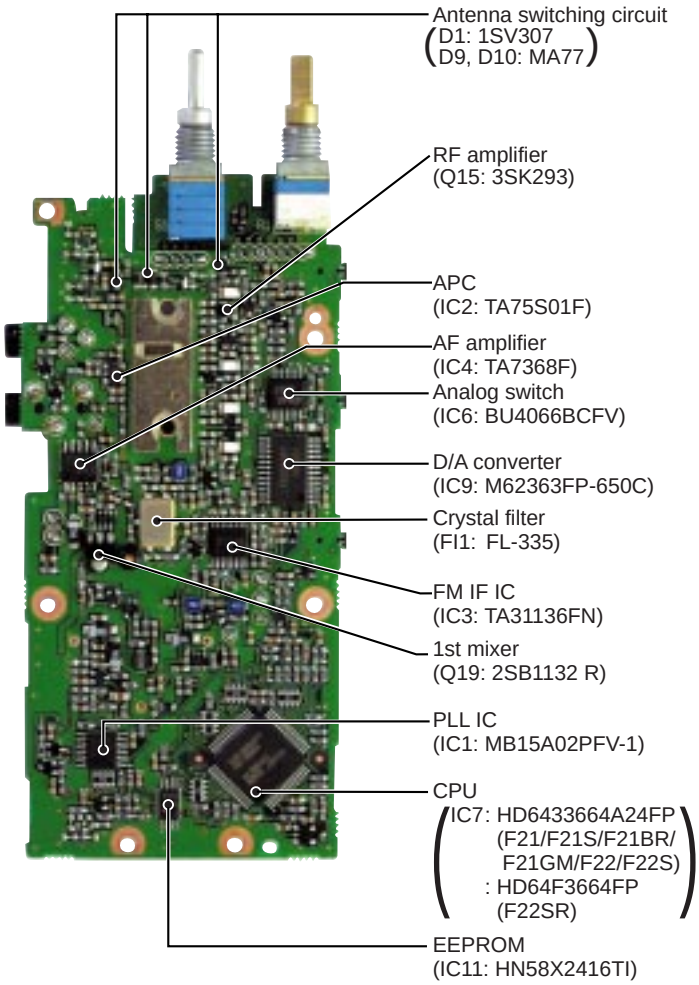
SECTION 2 INSIDE VIEWS

• MAIN UNIT

TOP VIEW



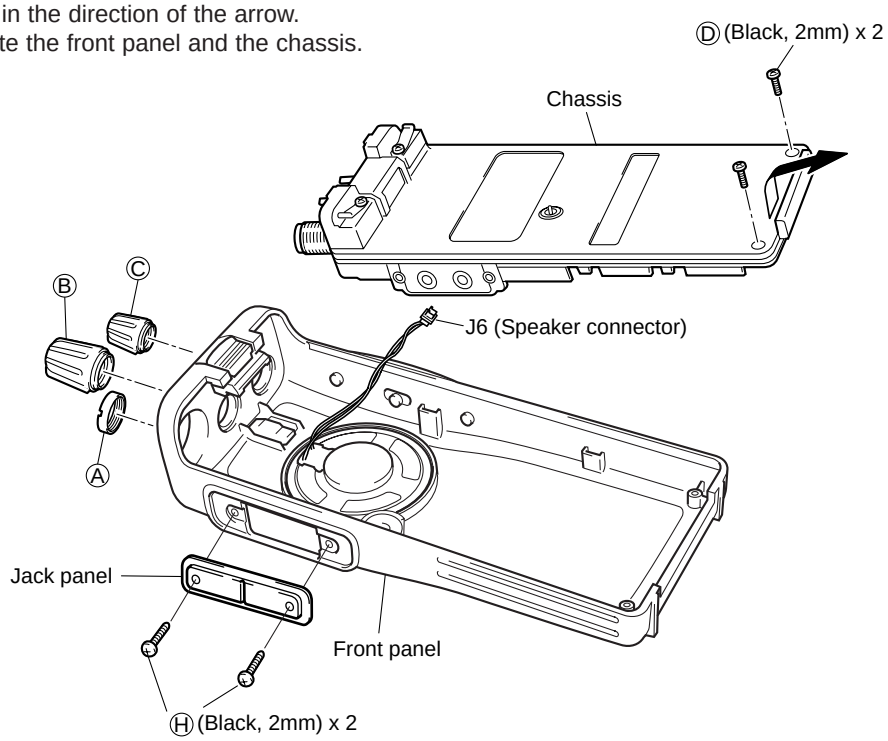
BOTTOM VIEW



SECTION 3 DISASSEMBLY INSTRUCTIONS

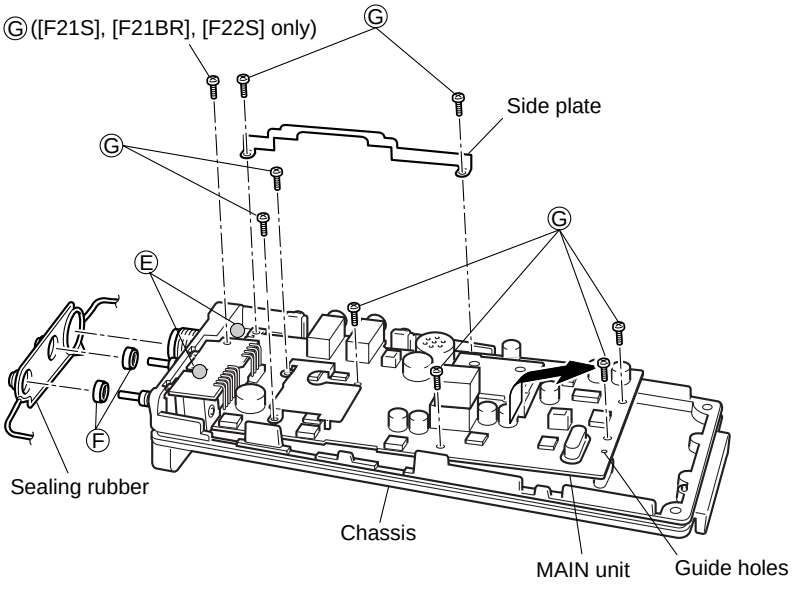
• REMOVING THE CHASSIS

① Unscrew 1 nut, Ⓐ, and remove 2 knobs, Ⓑ, Ⓒ.
② Unscrew 2 screws, Ⓓ.
③ Unscrew 2 screws, Ⓗ, to separate the Jack panel and the Front panel.
④ Take off the chassis in the direction of the arrow.
⑤ Unplug J6 to separate the front panel and the chassis.



• REMOVING THE MAIN UNIT

① Remove the searing rubber.
② Unsolder 2 points, Ⓔ, and unscrew 2 nuts, Ⓕ.
③ Unscrew 9 screws, Ⓖ, (silver, 2mm) to separate the chassis and the MAIN unit.
④ Take off the MAIN unit in the direction of the arrow.



SECTION 4 CIRCUIT DESCRIPTION

4-1 RECEIVER CIRCUITS

4-1-1 ANTENNA SWITCHING CIRCUIT

The antenna switching circuit functions as a low-pass filter while receiving. However, its impedance becomes very high while D9 and D10 are turned ON. Thus transmit signals are blocked from entering the receiver circuits. The antenna switching circuit employs a λ/4 type diode switching system.

Received signals are passed through the low-pass filter (L1, L2, C3, C5, C6). The filtered signals are applied to the λ/4 type antenna switching circuit (D9, D10).
The passed signals are then applied to the RF amplifier circuit.

4-1-2 RF CIRCUIT

The RF circuit amplifies signals within the range of frequency coverage and filters out-of-band signals.

The signals from the antenna switching circuit are amplified at the RF amplifier (Q15) after passing through the tunable bandpass filter (D12, L21, C104, C105). The amplified signals are applied to the 1st mixer circuit (Q16) after out-of-band signals are suppressed at the 3 stages tunable bandpass filter (D13, L22, C111, C113, D14, L23, C116, C117, D15, L24, C120, C122).

Varactor diodes are employed at the bandpass filters that track the filters and are controlled by the CPU (IC7) via the D/A convertor (IC9) using T1–T4 signals. These diodes tune the center frequency of an RF passband for wide bandwidth receiving and good image response rejection.

4-1-3 1ST MIXER AND 1ST IF CIRCUITS

The 1st mixer circuit converts the received signal into a fixed frequency of the 1st IF signal with a PLL output frequency. By changing the PLL frequency, only the desired frequency will pass through a crystal filter at the next stage of the 1st mixer.

The signals from the RF circuit are mixed at the 1st mixer (Q16) with a 1st LO signal (393.65–423.65 MHz) coming from the VCO circuit to produce a 46.35 MHz 1st IF signal.

The 1st IF signal is applied to a crystal filter (FI1) to suppress out-of-band signals. The filtered 1st IF signal is applied to the IF amplifier (Q17), then applied to the 2nd mixer circuit (IC3, pin 16).

4-1-4 2ND IF AND DEMODULATOR CIRCUITS

The 2nd mixer circuit converts the 1st IF signal into a 2nd IF signal. A double conversion superheterodyne system (which converts receive signals twice) improves the image rejection ratio and obtains stable receiver gain.

The 1st IF signal from the IF amplifier is applied to the 2nd mixer section of the FM IF IC (IC3, pin 16), and is mixed with the 2nd LO signal to be converted into a 450 kHz 2nd IF signal.

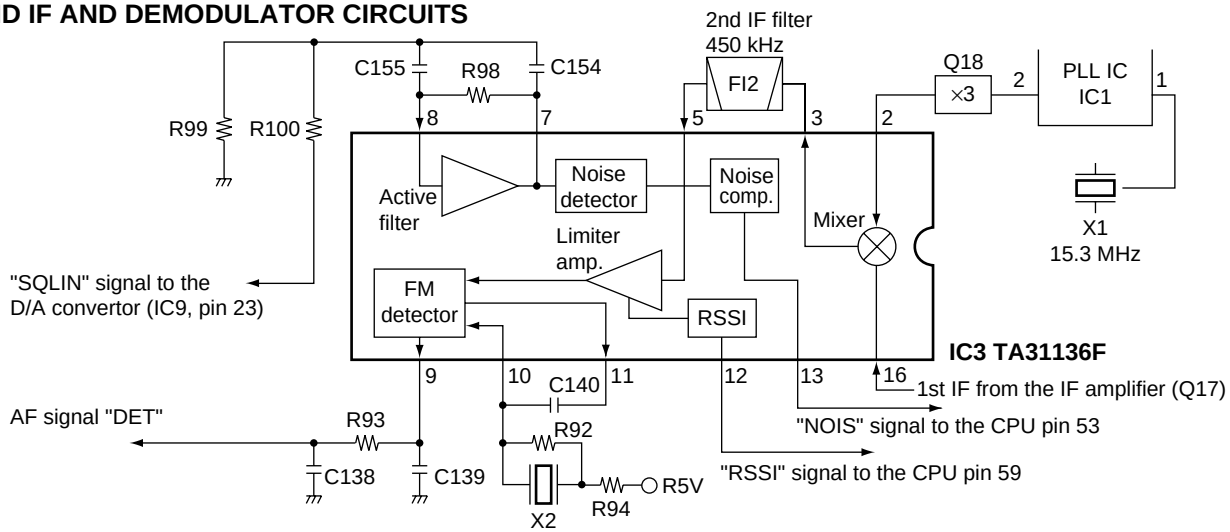
The FM IF IC contains the 2nd mixer, limiter amplifier, quadrature detector and active filter circuits. A 2nd LO signal (45.9 MHz) is produced at the PLL circuit by tripling it's reference frequency.

The 2nd IF signal from the 2nd mixer (IC3, pin 3) passes through a ceramic filter (FI2) to remove unwanted heterodyned frequencies. It is then amplified at the limiter amplifier (IC3, pin 5) and applied to the quadrature detector (IC3, pins 10, 11) to demodulate the 2nd IF signal into AF signals.

4-1-5 AF CIRCUIT

AF signals from the FM IF IC (IC3, pin 9) are applied to the analog switch (IC6, pin 1) after being passed through the high-pass filter (IC5B, pins 5, 7) via the "DET" signal. The signals pass through the low-pass filter (IC5D, pins 13, 14), and then applied to the analog switch (IC6, pins 9, 10) again. The output signals from the analog swtich (IC6, pin 11) are applied to the AF power amplifier (IC4, pin 4) after being passed through the [VOL] control (SW-A/SW-B unit; R143) via the "VOLIN" and "VOLOUT" signals.

• 2ND IF AND DEMODULATOR CIRCUITS



The applied AF signals are amplified at the AF power amplifier circuit (IC4, pin 4) to obtain the specified audio level. The amplified AF signals output from pin 10 as “AFOUT”signal are applied to the internal speaker (SP1) as the “SP” signal via the [SP] jack when no plug is connected to the jack.

4-1-6 SQUELCH CIRCUIT

A squelch circuit cuts out AF signals when no RF signals are received. By detecting noise components in the AF signals, the squelch switches the AF mute switch.

A portion of the AF signals from the FM IF IC (IC3, pin 9) as “DET” signal are applied to the D/A convertor IC (IC9, pin 24). The signals from the D/A convertor (IC9, pin 23) as “SQLIN” signals are applied to the active filter section (IC3, pin 8) where noise components are amplified and detected with an internal noise detector.

The active filter section amplifies noise components. The filtered signals are rectified at the noise detector section and converted into “NOIS” (pulse type) signals at the noise comparator section. The “NOIS” signal output from IC3, pin 13, and is applied to the CPU (IC7, pin 53).

The CPU detects the receiving signal strength from the number of the pulses, and outputs “EXST”, “SO”, “SCK” signals. The signals are applied to the expander IC (IC15, pins 1, 2, 3), and then outputs “RMUT” signal from pin 4. This signal controls the analog switch (IC6, pin 13) to cut the AF signal line.

4-2 TRANSMITTER CIRCUITS

4-2-1 MICROPHONE AMPLIFIER CIRCUIT

The microphone amplifier circuit amplifies audio signals with +6 dB/octave pre-emphasis characteristics from the microphone to a level needed for the modulation circuit.

The AF signals from the microphone are applied to the microphone amplifier circuit (IC5c, pin 10) after being pass through the high-pass filter (C186, C187). The amplified AF signals are passed through the low-pass filter circuit (IC5d, pins 13, 14) via the mute switch (IC6, pins 2, 3, 4). The filtered AF signals are applied to the modulator circuit after being passed through the mute switch (IC6, pins 8, 9, 10).

4-2-2 MODULATION CIRCUIT

The modulation circuit modulates the VCO oscillating signal (RF signal) using the microphone audio signal.

The audio signals change the reactance of a diode (D6) to modulate an oscillated signal at the TX-VCO circuit (Q11). The oscillated signal is amplified at the buffer-amplifiers (Q5, Q7), then applied to the T/R switching circuit (D3, D4).

4-2-3 DRIVE/POWER AMPLIFIER CIRCUITS

The signal from the VCO circuit passes through the T/R switching circuit (D3) and is amplified at the YGR (Q4, Q3), pre-drive (Q2) and power amplifier (Q1) to obtain 4 W of RF power (at 7.2 V DC). The amplified signal passes through the antenna switching circuit (D1) via the power detector (D2), and low-pass filter and is then applied to the antenna connector.

The bias current of the pre-drive (Q2) and the power amplifier (Q1) is controlled by the APC circuit.

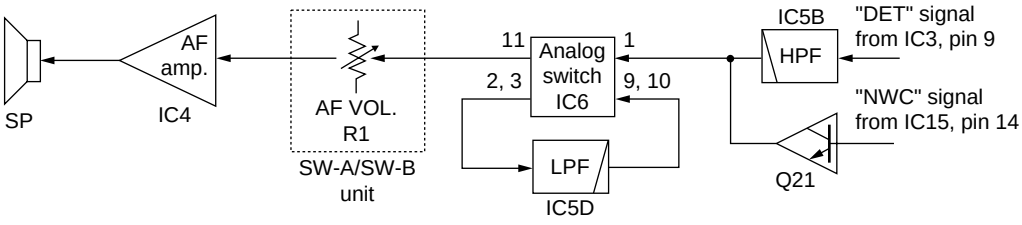
4-2-5 APC CIRCUIT

The APC circuit (IC2) protects the drive and the power amplifiers from excessive current drive, and selects HIGH or LOW output power.

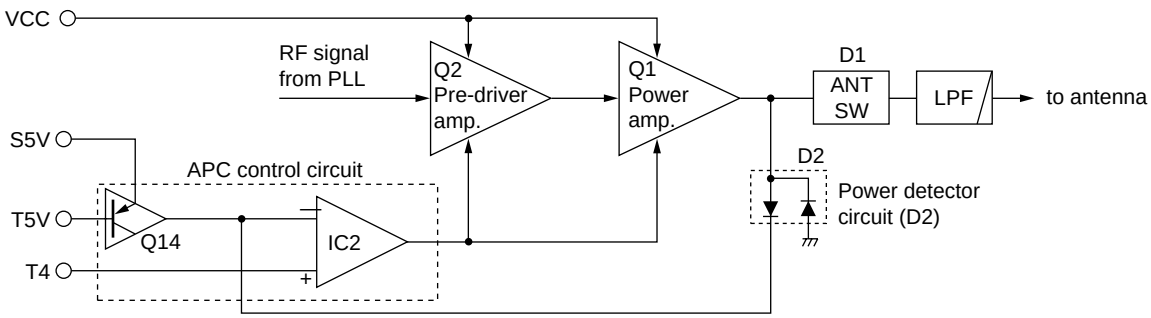
The signal output from the power detector circuit (D2) is applied to the differential amplifier (IC2, pin 3), and the “T4” signal from the expander (IC9, pin 11), controlled by the CPU (IC7), is applied to the other input for reference.

When the driving current is increased, input voltage of the differential amplifier (pin 3) will be increased. In such cases, the differential amplifier output voltage (pin 4) is decreased to reduce the driving current.

• AF CIRCUIT



• APC CIRCUIT



4-3 PLL CIRCUIT

4-3-1 GENERAL

A PLL circuit provides stable oscillation of the transmit frequency and receive 1st LO frequency. The PLL output compares the phase of the divided VCO frequency to the reference frequency. The PLL output frequency is controlled by a crystal oscillator and the divided ratio (N-data) of a programmable divider.

The PLL circuit, using a one chip PLL IC (IC1), directly generates the transmit frequency and divided ratio based on serial data from the CPU and compares the phases of VCO signals with the reference oscillator frequency. The PLL IC detects the out-of-step phase and output from pin 5.The reference frequency (15.3 MHz) is oscillated by X1.

4-3-2 TX LOOP

The generated signal at the TX-VCO (Q11, D7) enters the PLL IC (IC1, pin 8) and is divided at the programmable divider section and is then applied to the phase detector section.

The phase detector compares the input signal with a reference frequency, and then outputs the out-of-phase signal (pulse-type signal) from pin 5.

The pulse-type signal is converted into DC voltage (lock voltage) at the loop filter (R40–R42, C75–C77), and then applied to varactor diodes (D6) of the TX-VCO to stabilize the oscillated frequency.

4-3-3 RX LOOP

The generated signal at the RX-VCO (Q10, D5) enters the PLL IC (IC1, pin 8) and is divided at the programmable divider section and is then applied to the phase detector section.

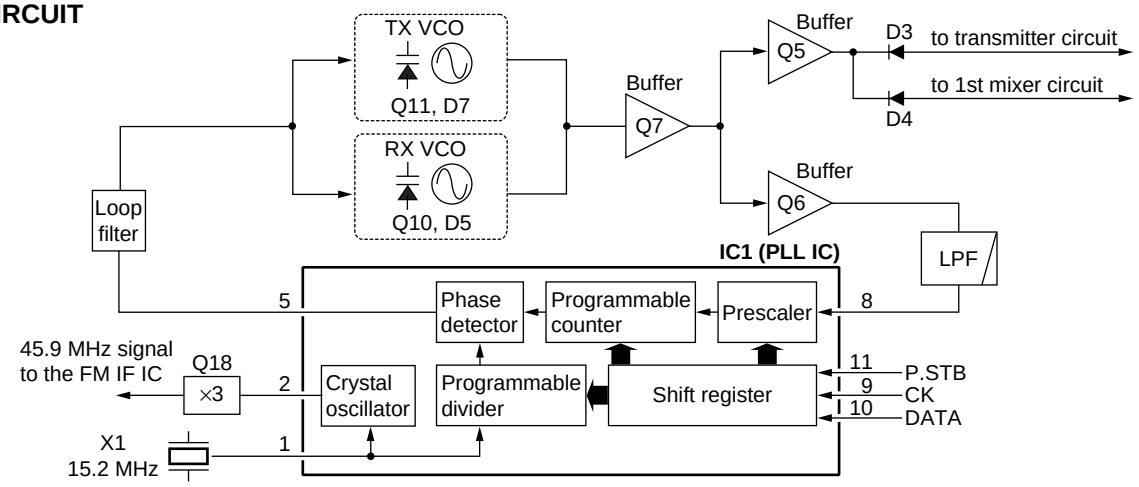
The phase detector compares the input signal with a reference frequency, and then outputs the out-of-phase signal (pulse-type signal) from pin 5.

The pulse-type signal is converted into DC voltage (lock voltage) at the loop filter (R40–R42, C74–C77), and then applied to varactor diodes (D5) of the RX-VCO to stabilize the oscillated frequency. The lock voltage is also used for the receiver circuit for the bandpass filter center frequency. The lock voltage from the loop filter is amplified at the buffer amplifier (Q13) and then applied to the CPU (IC7, pin 60). The signal is analyzed at the CPU, and then applied to the D/A convertor (IC9). The D/A convertor outputs “T1”, “T2”, “T3”, “T4” signals to RF bandpass filters D12–D15 to suppress harmonic components.

4-3-4 VCO CIRCUIT

The VCO outputs from Q11 (TX) and Q10 (RX) are buffer amplified at Q7 and Q6, and are then sent to the T/R switch (D3, D4). The receive LO signal is applied to the 1st mixer circuit (Q16) through an attenuator, and the tramsmit signal is applied to the YGR amplifier (Q4). A portion of the VCO output is reapplied to the PLL IC (IC1, pin 8) via the buffer amplifier (Q6) and low-pass filter (L18, R53, C89–C91).

• PLL CIRCUIT



4-4 POWER SUPPLY CIRCUITS

VOLTAGE LINE

LINE	DESCRIPTION
HV	The voltage from the attached battery pack.
VCC	The same voltage as the HV line (battery voltage) which is controlled by the power swtich ([VOL] control).
CPU5V	Common 5 V converted from the VCC line by the +5 regulator circuit (IC10). The output voltage is applied to the CPU (IC7), reset circuit (IC8) and etc.
T5V	5 V for transmitter circuits regulated by the T5 regulator circuit (Q27).
R5V	5 V for receiver circuits regulated by the R5 regulator circuit (Q26).
S5V	Common 5 V converted from the VCC line by the S5 regulator circuit (Q24, Q19).
+5V	The same voltage as the CPU5V line for the analog swtich (IC6), buffer amplifier (Q13), etc.
VCO5V	The same voltage as the +5V line for the TX-VCO (Q11), RX-VCO (Q10) and buffer amplifiers (Q5–Q7).

4-5 PORT ALLOCATIONS

4-5-1 CPU (IC7)

Pin number	Port name	Description
7	RES	Input port for RESET signal.
13 14 19 20	SENC0 SENC1 SENC2 SENC3	Outputs single tone encode signal.
23 24 25	CENC0 CENC1 CENC2	Outputs CTCSS/DTCS data signal.
28	SCK	Outputs serial clock signal to the PLL IC (IC1), EEPROM (IC11), etc.
29	SO	Outputs data signal to the PLL IC (IC1) and D/A convertor (IC9).
30	BEEP	Outputs beep audio signal.
36	PLST	I/O port for strobe signal from/to PLL IC (IC9).
37	DAST	• Outputs strobe signal to the D/A convertor (IC9). • Input port for the initial version signal.
38	EXST	Outputs strobe signal for the expander IC (IC15).
39	PTT	Input port for [PTT] swtich signal. High: While [PTT] switch is pushed.
40	TXC	Outputs TX mute control signal. High: While transmitting
41	RLED	Outputs BUSY LED control signal. High: While receiving.
42	TLED	Outputs TX LED control signal. high: While transmitting.
43	AFON	Outputs control signal for the regulator circuit of AF power amplifier. High: While squelch is open, etc.
44	ESDA	I/O port for data signal from/to the EEPROM (IC11).
45	CLI	Input port for cloning signal.
46	CLO	Outputs the cloning signal.
51 52	F1 F2	Input ports for the customization key signals.
53	NOIS	Input port for the noise pulse signal for the squelch function.
54	UNLK	Input port for PLL unlock signal. High: PLL is locked.
55	TEMP	Input port for the transceiver's internal tempereture detection.
57	CDEC	Input port for CTCSS/DTCS signals.
58	SDEC	Input port for single tone decode signal.
59	RSSI	Input port for the RSSI voltage.
60	LVIN	Input port for the PLL lock voltage.

CPU (IC7)–continued

Pin number	Port name	Description
61	BDET	Input port for the battery's type detection.
62	BATV	Input port for battely voltage detection.

4-5-2 OUTPUT EXPANDER IC (IC15)

Pin number	Port name	Description
4	CSFT	Outputs clock shift control signal for CPU.
5	RMUT	Outputs RX mute control signal.
6	MMUT	Outputs TX mute control signal.
7	DUSE	Outputs low-pass filter cut-off frequency control signal when DTCS is activated.
11	T5C	Outputs T5 regulator control signal. Low: While transmitting.
12	R5C	Outputs R5 regulator control signal. Low: While receiving.
13	S5C	Outputs S5 regulator control signal. Low: While power is ON.
14	NWC	Outputs Narrow/Wide of channel spacing control signal. Low: While Narrow is selected.

4-5-3 D/A CONVERTOR IC (IC9)

Pin number	Port name	Description
2, 3, 10, 11	T1–T4	Output tunable bandpass filters control signals.
14	REF	Outputs differential voltage for the reference oscillator (Q31, D19, X1).
15	BAL	Outputs DTCS balance control signal.
22	DEV	Outputs modulating signal for the modulator circuit (D6).

SECTION 5 ADJUSTMENT PROCEDURES

5-1 PREPARATION

When you adjust the contents on page 5-5 or 5-6, SOFTWARE ADJUSTMENT, the optional CS-F21 ADJ ADJUSTMENT SOFTWARE (Rev. 1.0 or later), OPC-478 CLONING CABLE and a JIG CABLE (see illustration at page 5-2) are required.

■ REQUIRED TEST EQUIPMENT

EQUIPMENT	GRADE AND RANGE	EQUIPMENT	GRADE AND RANGE
DC power supply	Output voltage : 7.2 V DC Current capacity : 5 A or more	Audio generator	Frequency range : 300–3000 Hz Output level : 1–500 mV
RF power meter (terminated type)	Measuring range : 1–10 W Frequency range : 300–600 MHz Impedance : 50 Ω SWR : Less than 1.2 : 1	Attenuator	Power attenuation : 40 or 50 dB Capacity : 10 W or more
Frequency counter	Frequency range : 0.1–600 MHz Frequency accuracy : ±1 ppm or better Sensitivity : 100 mV or better	Standard signal generator (SSG)	Frequency range : 120–600 MHz Output level : 0.1 µV–32 mV (–127 to –17 dBm)
		DC voltmeter	Input impedance : 50 kΩ/V DC or better
FM deviation meter	Frequency range : DC–600 MHz Measuring range : 0 to ±5 kHz	Oscilloscope	Frequency range : DC–20 MHz Measuring range : 0.01–20 V
Digital multimeter	Input impedance : 10 MΩ/V DC or better	AC millivoltmeter	Measuring range : 10 mV–10 V

■ SYSTEM REQUIREMENTS

- IBM PC compatible computer with an RS -232C serial port (38400 bps or faster)
- Microsoft Windows 95 or Windows 98
- Intel i486DX processor or faster (Pentium 100 MHz or faster recommended)
- At least 16 MB RAM and 10 MB of hard disk space
- 640×480 pixel display (800×600 pixel display recommended)

■ ADJUSTMENT SOFTWARE INSTALLATION

① Boot up Windows.
 - Quit all applications when Windows is running.
② Insert the cloning software CD-ROM into the appropriate CD-ROM drive.
③ Select 'Run' from the [Start] menu.
④ Type the setup program name using the full path name, then push the [Enter] key. (For example; D:\ setup)
⑤ Follow the prompts.
⑥ Program group 'CS-F21' appears in the 'Programs' folder of the [Start] menu.

■ STARTING SOFTWARE ADJUSTMENT

① Connect the transceiver and PC with the optional OPC-478 and the JIG cable.
② Boot up Windows, and turn the transceiver power ON.
③ Click the program group 'CS-F21 ADJ' in the 'Programs' folder of the [Start] menu, then CS-21G ADJ's window is appeared.
④ Click 'Connect' on the CS-F21's window, then appears the transceiver's up-to-date condition.
⑤ Set or modify adjustment data as desired.

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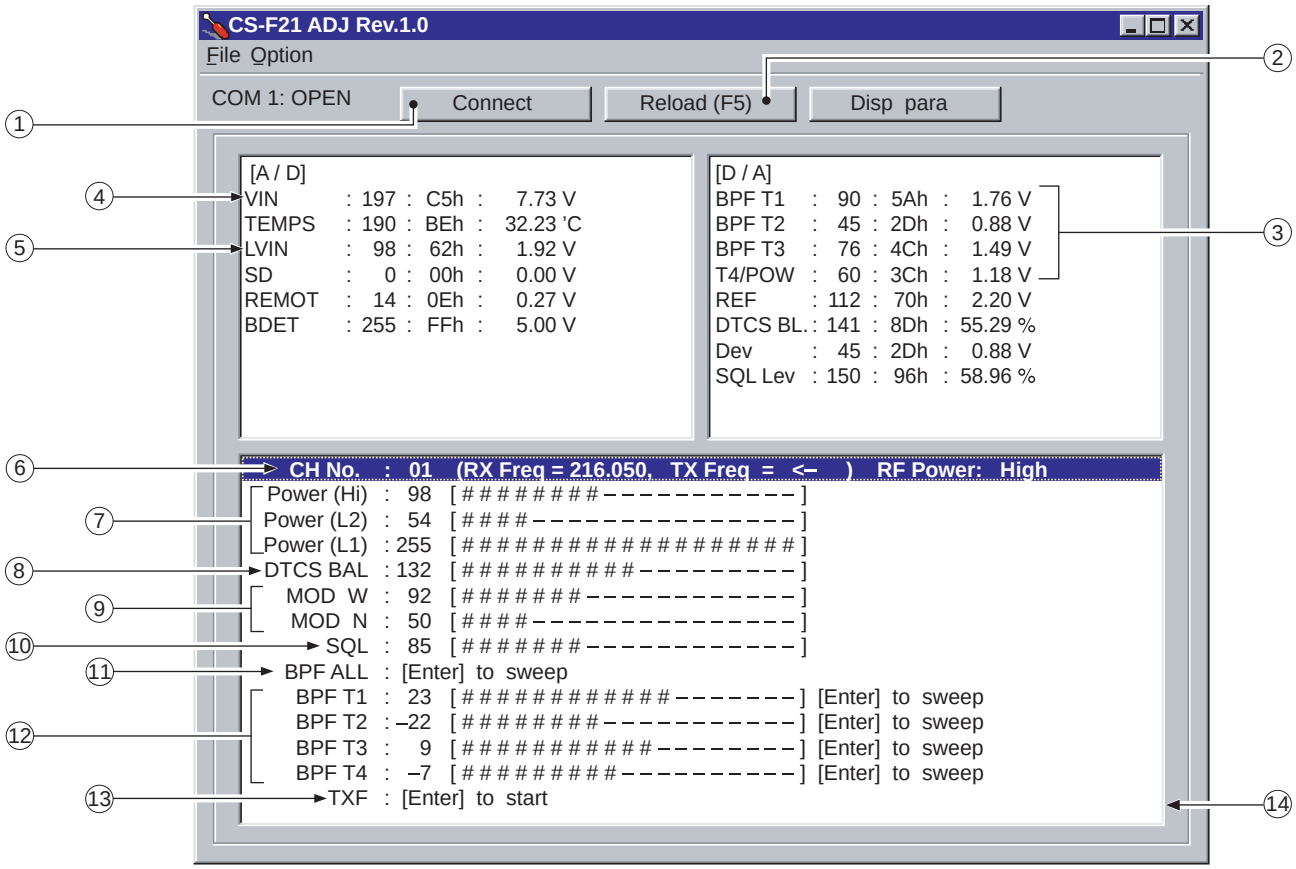
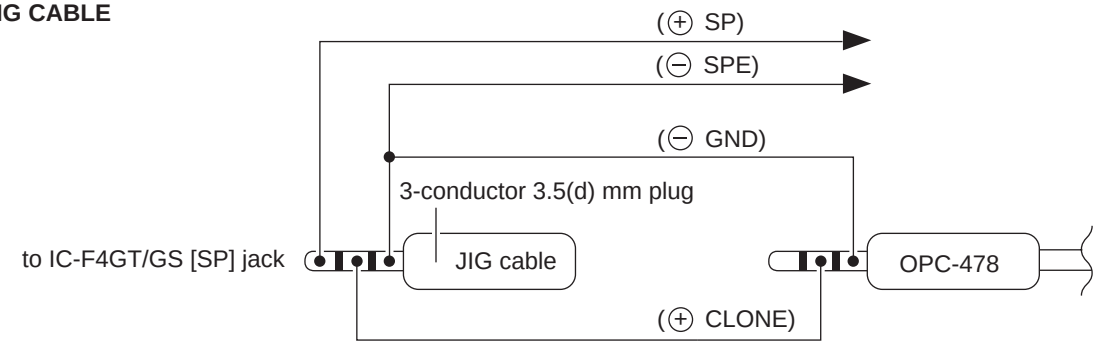
• SCREEN DISPLAY EXAMPLE


CS-F21 ADJ Rev.1.0
File Option
COM 1: OPEN
Connect
Reload (F5)
Disp para
[A / D]
VIN : 197 : C5h : 7.73 V
TEMPS : 190 : BEh : 32.23 'C
LVIN : 98 : 62h : 1.92 V
SD : 0 : 00h : 0.00 V
REMOT : 14 : 0Eh : 0.27 V
BDET : 255 : FFh : 5.00 V
[D / A]
BPF T1 : 90 : 5Ah : 1.76 V
BPF T2 : 45 : 2Dh : 0.88 V
BPF T3 : 76 : 4Ch : 1.49 V
T4/POW : 60 : 3Ch : 1.18 V
REF : 112 : 70h : 2.20 V
DTCS BL. : 141 : 8Dh : 55.29 %
Dev : 45 : 2Dh : 0.88 V
SQL Lev : 150 : 96h : 58.96 %
CH No. : 01 (RX Freq = 216.050, TX Freq = <–) RF Power: High
Power (Hi) : 98
Power (L2) : 54
Power (L1) : 255
DTCS BAL : 132
MOD W : 92
MOD N : 50
SQL : 85
BPF ALL : [Enter] to sweep
BPF T1 : 23 [Enter] to sweep
BPF T2 : –22 [Enter] to sweep
BPF T3 : 9 [Enter] to sweep
BPF T4 : –7 [Enter] to sweep
TXF : [Enter] to start
1
2
3
4
5
6
7
8
9
10
11
12
13
14

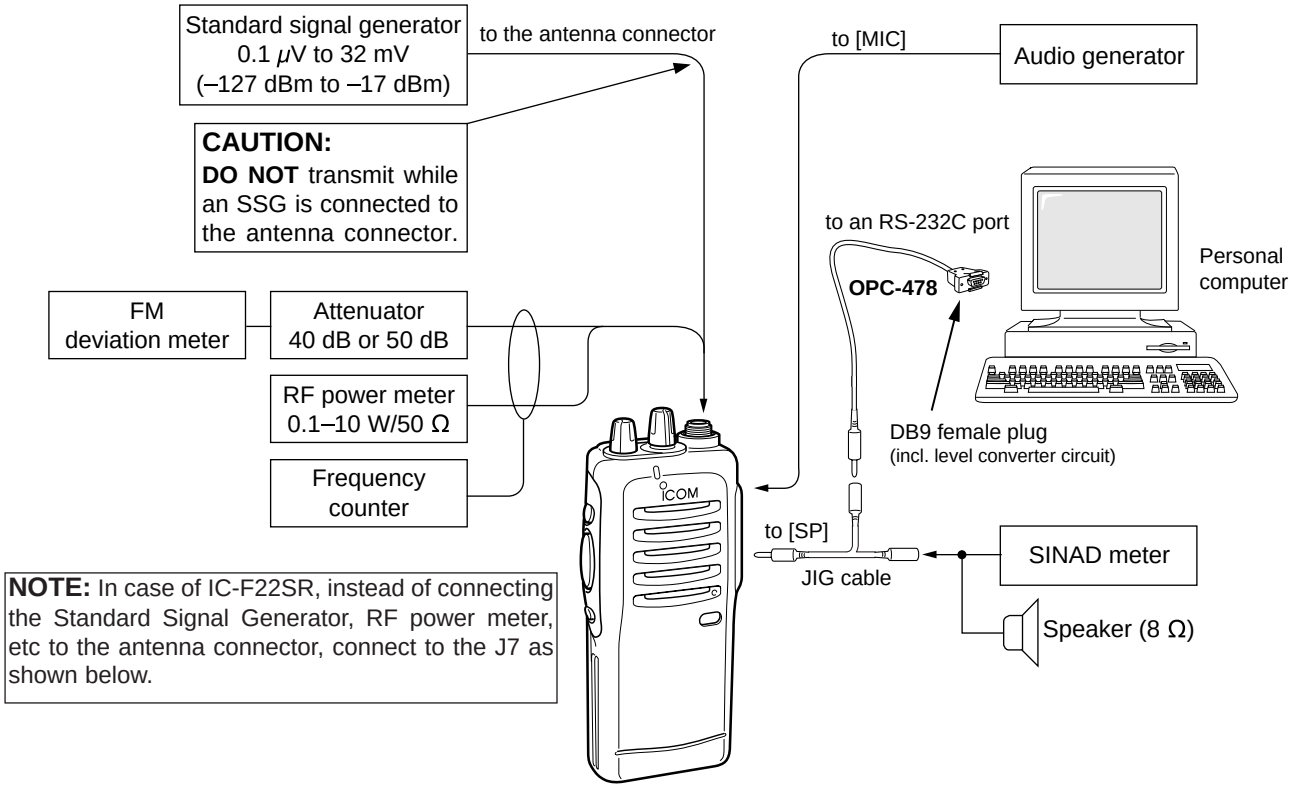
NOTE: The above values for settings are example only.
Each transceiver has its own specific values for each setting.

(1) : Transceiver's connection state
(2) : Reload adjustment data
(3) : Receive sensitivity measurement
(4) : Connected DC voltage
(5) : PLL lock voltage
(6) : Operating channel select
(7) : RF output power
(8) : DTCS wave balance
(9) : FM deviation
(10) : Squelch level
(11) : Receive sensitivity (automatically)
(12) : Receive sensitivity (manually)
(13) : Reference frequency
(14) : Adjustment items

• JIG CABLE

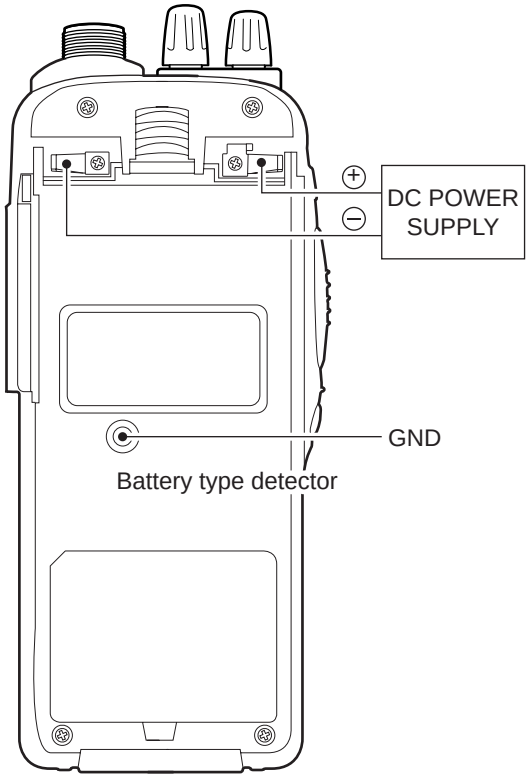


• **CONNECTION**



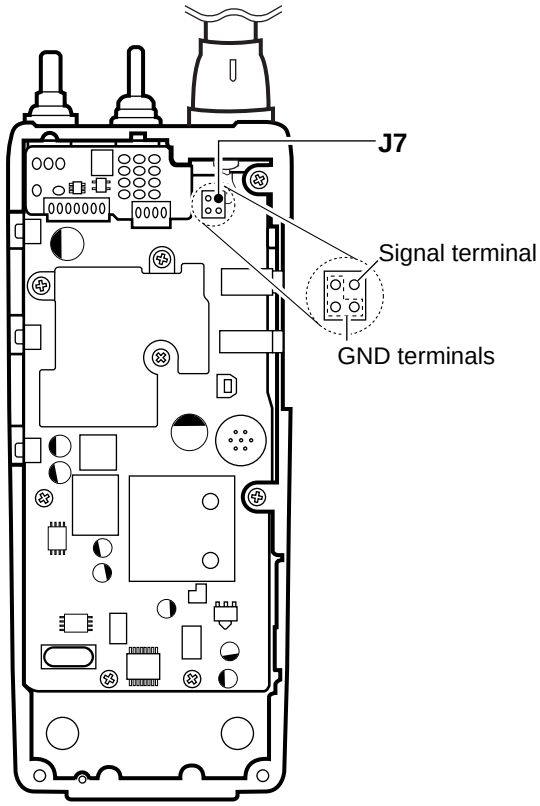
NOTE: In case of IC-F22SR, instead of connecting the Standard Signal Generator, RF power meter, etc to the antenna connector, connect to the J7 as shown below.

• **DC POWER CABLE CONNECTIONS**



NOTE: When you adjust the output power (high power), the battery type detector must be connected to GND (see illustration at above). Ohterwise the transceiver does not transmit high power, the output power will be low.

• **IC-F22SR ANTENNA CONNECT POINT**

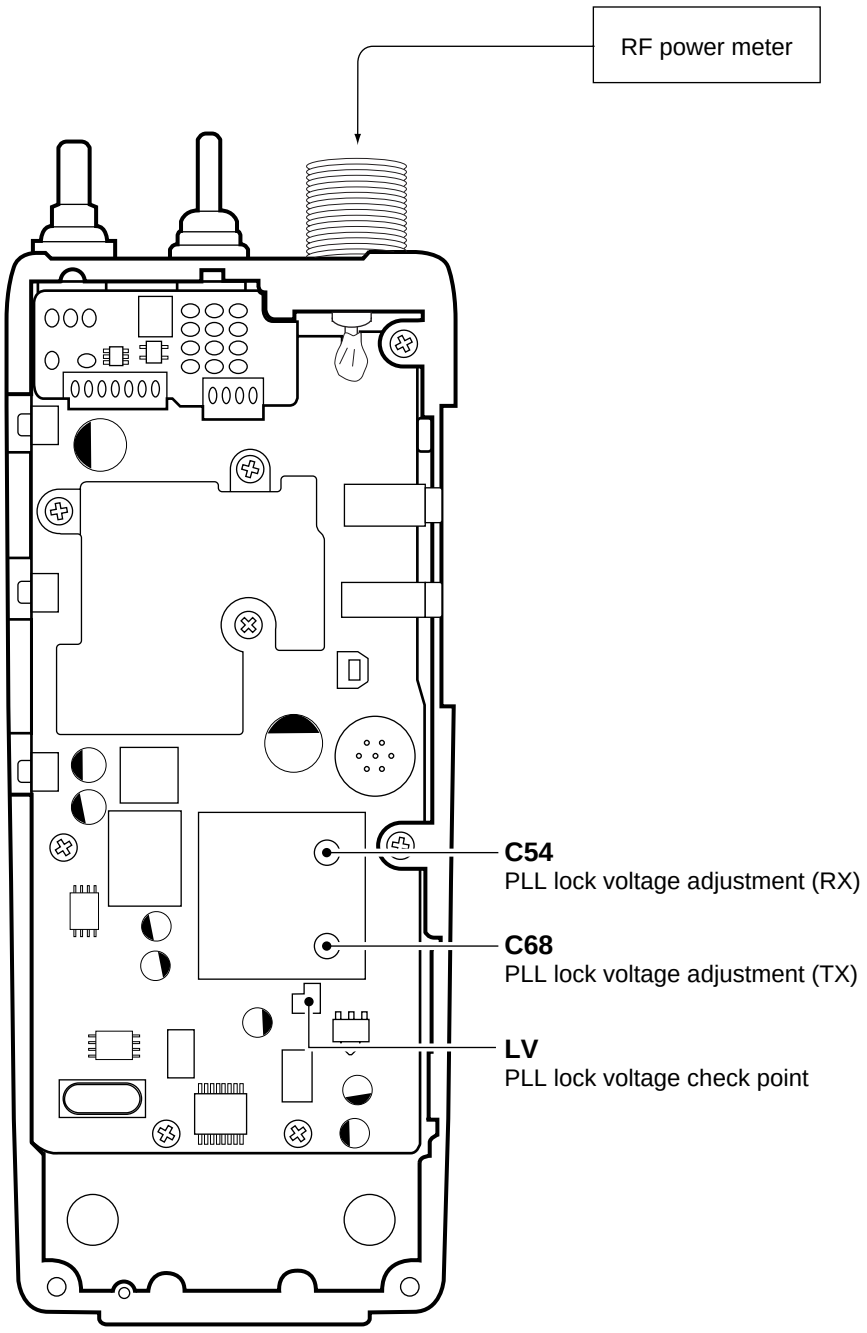


NOTE: When adjusting SOFTWARE ADJUSTMENT of IC-F22SR, connect the Standard Signal generator, RF power meter, etc to the J7 (See illustration at above).

5-2 PLL ADJUSTMENT

ADJUSTMENT		ADJUSTMENT CONDITIONS	MEASUREMENT		VALUE	ADJUSTMENT	
			UNIT	LOCATION		UNIT	ADJUST
PLL LOCK VOLTAGE	1	• Operating frequency : 440.000 MHz Ⓐ 462.550 MHzⒷ, Ⓒ 446.00625 MHz Ⓓ • Receiving	MAIN	Connect a digital multi meter to check point LV.	1.3 V Ⓐ–Ⓒ 1.8 V Ⓓ	MAIN	C54
	2	• Transmitting			1.3 V Ⓐ–Ⓒ 1.8 V Ⓓ		C68

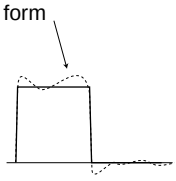
Ⓐ: [F21], [F21S], [F22] and [F22S], Ⓑ: [F21BR], Ⓒ: [F21GM], Ⓓ: [F22SR]



TOP VIEW

5-3 SOFTWARE ADJUSTMENT

Select an operation using [↑] / [↓] keys, then set specified value using [←] / [→] keys on the connected computer keyboard.

ADJUSTMENT		ADJUSTMENT CONDITION	MEASUREMENT		VALUE
			UNIT	LOCATION	
REFERENCE FREQUENCY [TXF]	1	• Operating frequency: 470.000 MHz Ⓐ 469.550 MHz Ⓑ 467.725 MHz Ⓒ 446.00625 MHz Ⓓ • High/Low switch : Low • Connect the RF power meter or 50 Ω dummy load to the antenna connector*1. • Transmitting	Top panel	Loosely couple a frequnecy counter to the antenna connector*1.	470.0000 MHz Ⓐ 469.5500 MHz Ⓑ 467.7250 MHz Ⓒ 446.0062 MHz Ⓓ
OUTPUT POWER [POWER(Hi)]	1	• Operating frequency: 440.000 MHz Ⓐ 462.550 MHz Ⓑ, Ⓒ 446.00625 MHz Ⓓ • High/Low switch : High • Transmitting	Top panel	Connect an RF power meter to the antenna connector*1.	4.0 W Ⓐ, Ⓒ 2.0 W Ⓑ 1.5 W Ⓓ
[POWER(L2)]	2	• High/Low switch : Low2 • Transmitting			2.0 W Ⓐ, Ⓑ, Ⓒ 1.5 W Ⓓ
[POWER(L1)]	3	• High/Low switch : Low1 • Transmitting			1.0 W
FM DEVIATION (Wide) [MOD W] (Ⓐ, Ⓑ, Ⓒ only)	1	• Operating frequency: 455.000 MHz Ⓐ 466.050 MHz Ⓑ 465.138 MHz Ⓒ • High/Low switch : Low1 • Channel spacing : Wide • Connect the audio generator to the [MIC] jack and set as: 1.0 kHz/150 mVrms • Set the FM deviation meter as: HPF : OFF LPF : 20 kHz De-emphasis : OFF Detector : (P±P)/2 • Transmitting	Top panel	Connect an FM deviation meter to the antenna connector*1 through the attenuator.	±4.10 kHz (except Ⓓ)
(Narrow) [MOD N]	2	• Operating frequency: 455.000 MHz Ⓐ 466.050 MHz Ⓑ 465.138 MHz Ⓒ 446.00625 MHz Ⓓ • Channel spacing : Narrow • Transmitting			±2.10 kHz
DTCS WAVE FORM [DTCS BAL]	1	• Operating frequency: 455.000 MHz Ⓐ 466.050 MHz Ⓑ 465.138 MHz Ⓒ 446.00625 MHz Ⓓ • High/Low switch : Low1 • No audio applied to the [MIC] jack. • DTCS code : 007 • Transmitting	Top panel	Connect an FM deviation meter with an oscilloscope to the antenna connector*1 through an attenuator.	Set to flat wave form 

Ⓐ: [F21], [F21S], [F22] and [F22S], Ⓑ: [F21BR], Ⓒ: [F21GM], Ⓓ: [F22SR]

*1In case of IC-F22SR, instead of the antenna connector, connect to the J7 as shown page 5-3.

SOFTWARE ADJUSTMENT – continued

Select an operation using [↑] / [↓] keys, then set specified value using [←] / [→] keys on the connected computer keyboard.

ADJUSTMENT		ADJUSTMENT CONDITION	MEASUREMENT		VALUE
			UNIT	LOCATION	
RX SENSITIVITY [BPF T1]–[BPF T4]	1	• Operating frequency: 470.000 MHz Ⓐ 469.550 MHz Ⓑ 467.725 MHz Ⓒ 446.09375 MHz Ⓓ • Channel spacing :Narrow • Connect a standard signal generator to the antenna connector*1 and set as: Frequency : 470.000 MHz Ⓐ 469.550 MHz Ⓑ 467.725 MHz Ⓒ 446.09375 MHz Ⓓ Level : 10 µV* (–87 dBm) Modulation : OFF Deviation : ±1.75 kHz • Receiving	Top panel	Connect a SINAD meter with an 8 Ω load to the [SP] jack.	Minimum distortion level
		CONVENIENT: The BPF T1–BPF T4 can be adjusted automatically. ①-1: Set the cursol to “BPF ALL” on the adjustment program and then push [ENTER] key. ①-2: The connected PC tunes BPF T1–BPF T4 to peak levels. or ②-1: Set the cursol to one of BPF T1, T2, T3, or T4 as desired. ②-2: Push [ENTER] key to start tuning. ②-3: Repeat ②-1 and ②-2 to perform additional BPF tuning.			
SQUELCH LEVEL [SQL]	1 2	• Operating frequency: 455.000 MHz Ⓐ 466.050 MHz Ⓑ 465.138 MHz Ⓒ 446.09375 MHz Ⓓ • Channel spacing : Narrow • Connect a standard signal generator to the antenna connector*1 and set as: Frequency : 455.000 MHz Ⓐ 466.050 MHz Ⓑ 465.138 MHz Ⓒ 446.09375 MHz Ⓓ Level : 0.2 µV* (–121 dBm) Modulation : 1 kHz Deviation : ±1.75 kHz • Receiving	Top panel	Connect a SINAD meter with an 8Ω load to the [SP] jack.	12 dB SINAD
		• Receiving			At the point where the audio signals just appears.

Ⓐ: [F21], [F21S], [F22] and [F22S], Ⓑ: [F21BR], Ⓒ: [F21GM], Ⓓ: [F22SR]

*The output level of the standard signal generator (SSG) is indicated as the SSG’s open circuit.

*1In case of IC-F22SR, instead of the antenna connector, connect to the J7 as shown page 5-3.

SECTION 6 PARTS LIST

[SW-A UNIT] ([F21], [F21GM], [F22] AND [F22SR])

REF NO.	ORDER NO.	DESCRIPTION		
Q1	1590003020	S.TRANSISTOR	XP4216-(TX)	
R1	7210003060	VARIABLE	TP76N00N-15F-10KA-2251	
R2	7030003380	S.RESISTOR	ERJ3GEYJ 331 V (330 Ω)	
R3	7030003410	S.RESISTOR	ERJ3GEYJ 561 V (560 Ω)	
F1	5210000710	S.FUSE	KAB 2402 322 NA29	
DS1	5040002070	S.LED	LNJ107W5PRW	
S1	2250000450	ENCODER	TP70QF4161-16F-2458A	
EP1	0910053673	PCB	B 5603C	[F21], [F21GM]
	0910054163	PCB	B 5603C	[F22], [F22SR]

[SW-B UNIT] ([F21BR], [F21S] AND [F22S])

REF NO.	ORDER NO.	DESCRIPTION		
Q1	1590003020	S.TRANSISTOR	XP4216-(TX)	
R1	7210003060	VARIABLE	TP76N00N-15F-10KA-2251	
R2	7030003380	S.RESISTOR	ERJ3GEYJ 331 V (330 Ω)	
R3	7030003410	S.RESISTOR	ERJ3GEYJ 561 V (560 Ω)	
F1	5210000710	S.FUSE	KAB 2402 322 NA29	
DS1	5040002070	S.LED	LNJ107W5PRW	
W1	7120000470	JUMPER	ERDS2T0	
W2	7120000470	JUMPER	ERDS2T0	
EP1	0910053683	PCB	B 5604C	[F21BR], [F21S]
	0910054173	PCB	B 5604C	[F22S]

[MAIN UNIT]

REF NO.	ORDER NO.	DESCRIPTION		
IC1	1140005990	S.IC	MB15A02PFV1-G-BND-ER	
IC2	1110002750	S.IC	TA75S01F (TE85R)	
IC3	1110003490	S.IC	TA31136FN (D,EL)	
IC4	1110001810	S.IC	TA7368F (TP1)	
IC5	1110005320	S.IC	NJM13403V-TE1	
IC6	1130008090	S.IC	BU4066BCFV-E1	
IC7	1140009850	S.IC	HD6433664A24FP (FX-2458A-1)	except [F22SR]
	1140010200	S.IC	HD64F3664FP (FX-2458B)	[F22SR] only
IC8	1130009110	S.IC	S-80942ANMP-DD6-T2	
IC9	1190000350	S.IC	M62363FP-650C	
IC10	1110005350	S.IC	NJM2870F05-TE1	
IC11	1130010390	S.IC	HN58X2416TI	
IC12	1110005330	S.IC	NJM12904V-TE1	
IC13	1130007020	S.IC	TC7S66FU (TE85R)	
IC15	1130007570	S.IC	BU4094BCFV-E2	

[MAIN UNIT]

REF NO.	ORDER NO.	DESCRIPTION	
IC16	1110005330	S.IC	NJM12904V-TE1
Q1	1560001050	S.FET	2SK2974
Q2	1560001020	S.FET	2SK2973 (MTS101P)
Q3	1530002620	S.TRANSISTOR	2SC3585 R44-T2B
Q4	1530003310	S.TRANSISTOR	2SC5107-O (TE85R)
Q5	1530003310	S.TRANSISTOR	2SC5107-O (TE85R)
Q6	1530003310	S.TRANSISTOR	2SC5107-O (TE85R)
Q7	1530003310	S.TRANSISTOR	2SC5107-O (TE85R)
Q8	1590000430	S.TRANSISTOR	DTC144EUA T106
Q9	1590001400	S.TRANSISTOR	XP1214 (TX)
Q10	1530003230	S.TRANSISTOR	2SC5085-Y (TE85R)
Q11	1530003230	S.TRANSISTOR	2SC5085-Y (TE85R)
Q12	1590001190	S.TRANSISTOR	XP6501-(TX) .AB
Q13	1560000540	S.FET	2SK880-Y (TE85R)
Q14	1590000720	S.TRANSISTOR	DTA144EUA T106
Q15	1580000730	S.FET	3SK293 (TE85L)
Q16	1580000660	S.FET	3SK272-(TX)
Q17	1530002600	S.TRANSISTOR	2SC4215-O (TE85R)
Q18	1530002690	S.TRANSISTOR	2SC4116-GR (TE85R)
Q19	1520000460	S.TRANSISTOR	2SB1132 T100 R
Q20	1590001190	S.TRANSISTOR	XP6501-(TX) .AB
Q21	1590000430	S.TRANSISTOR	DTC144EUA T106
Q22	1590002530	S.TRANSISTOR	UN911H (TX)
Q23	1590000720	S.TRANSISTOR	DTA144EUA T106
Q24	1520000460	S.TRANSISTOR	2SB1132 T100 R
Q25	1590001190	S.TRANSISTOR	XP6501-(TX) .AB
Q26	1510000920	S.TRANSISTOR	2SA1577 T107 Q
Q27	1510000920	S.TRANSISTOR	2SA1577 T107 Q
Q28	1590000430	S.TRANSISTOR	DTC144EUA T106
Q29	1530002690	S.TRANSISTOR	2SC4116-GR (TE85R)
Q30	1590001770	S.TRANSISTOR	XP1213 (TX)
Q31	1530002600	S.TRANSISTOR	2SC4215-O (TE85R)
Q32	1590000660	S.TRANSISTOR	DTC144TU T107
Q33	1560000840	S.FET	2SK1829 (TE85R)
D1	1750000580	S.DIODE	1SV307 (TPH3)
D2	1790001670	S.DIODE	RB706F-40T106
D3	1790000620	S.DIODE	MA77 (TX)
D4	1790000620	S.DIODE	MA77 (TX)
D5	1720000780	S.VARICAP	HVU350B TRF
D6	1720000570	S.VARICAP	MA368 (TX)
D7	1720000780	S.VARICAP	HVU350B TRF
D9	1790000620	S.DIODE	MA77 (TX)
D10	1790000620	S.DIODE	MA77 (TX)
D12	1720000780	S.VARICAP	HVU350B TRF
D13	1720000780	S.VARICAP	HVU350B TRF
D14	1720000780	S.VARICAP	HVU350B TRF
D15	1720000780	S.VARICAP	HVU350B TRF
D16	1790000620	S.DIODE	MA77 (TX)
D17	1790001670	S.DIODE	RB706F-40T106
D18	1790001250	S.DIODE	MA2S111-(TX)
D19	1750000830	S.VARICAP	HVC362TRF
D20	1790001250	S.DIODE	MA2S111-(TX)
D21	1790001250	S.DIODE	MA2S111-(TX)
D22	1790001250	S.DIODE	MA2S111-(TX)
FI1	2030000150	S.MONOLITH	FL-335 (46.350 MHz)
FI2	2020001840	CERAMIC	ALFYM450F=K
X1	6050011120	S.XTAL	CR-671A (15.300 MHz)
X2	6070000210	S.DISCRIMINATOR	CDBCA450CX24
X3	6050011180	S.XTAL	CR-702 (14.7456 MHz)
L1	6200008240	S.COIL	0.30-0.9-5TL 14N
L2	6200008240	S.COIL	0.30-0.9-5TL 14N
L3	6200002850	S.COIL	NL 252018T-R82J
L4	6200008240	S.COIL	0.30-0.9-5TL 14N
L5	6200009470	S.COIL	0.40-0.9-2TL
L6	6200003590	S.COIL	EXCCL3225U1
L8	6200005670	S.COIL	ELJRE 12NG-F

Ⓐ: [F21], [F21BR], [F21GM], [F21S] Ⓑ: [F22], [F22S], [F22SR] Ⓒ: [F21BR], [F21GM], [F22SR]
Ⓓ: [F21], [F21S], [F22], [F22S] Ⓔ: [F21BR], [F21S], [F22S] Ⓕ: [F21GM], [F21], [F22], [F22SR]

S.=Surface mount

[MAIN UNIT]

REF NO.	ORDER NO.	DESCRIPTION		
L9	6200005680	S.COIL	ELJRE 15NG-F	
L10	6200005710	S.COIL	ELJRE 27NG-F	
L11	6200005710	S.COIL	ELJRE 27NG-F	
L13	6200009360	S.COIL	0.45-1.4-3TL 11N	
L14	6200002860	S.COIL	NL 252018T-4R7J	
L15	6200002800	S.COIL	ELJFC R68M-F	
L16	6200009360	S.COIL	0.45-1.4-3TL 11N	
L17	6200002860	S.COIL	NL 252018T-4R7J	
L18	6200005680	S.COIL	ELJRE 15NG-F	
L19	6200008240	S.COIL	0.30-0.9-5TL 14N	
L20	6200008240	S.COIL	0.30-0.9-5TL 14N	
L21	6200007670	S.COIL	LQN21A 10NJ04	
L22	6200007670	S.COIL	LQN21A 10NJ04	
L23	6200007670	S.COIL	LQN21A 10NJ04	
L24	6200007670	S.COIL	LQN21A 10NJ04	
L25	6200005720	S.COIL	ELJRE 33NG-F	
L26	6200001980	S.COIL	NL 252018T-1R0J	
L27	6200002850	S.COIL	NL 252018T-R82J	
L28	6200002840	S.COIL	NL 252018T-R22J	
L29	6200009210	S.COIL	NL 252018T-390J	
L30	6200009760	S.COIL	0.30-0.9-9TR	
R1	7030003670	S.RESISTOR	ERJ3GEYJ 823 V (82 kΩ)	
R2	7030003320	S.RESISTOR	ERJ3GEYJ 101 V (100 Ω)	
R3	7030003580	S.RESISTOR	ERJ3GEYJ 153 V (15 kΩ)	
R4	7030003440	S.RESISTOR	ERJ3GEYJ 102 V (1 kΩ)	
R5	7030003200	S.RESISTOR	ERJ3GEYJ 100 V (10 Ω)	Ⓐ
	7030003280	S.RESISTOR	ERJ3GEYJ 470 V (47 Ω)	Ⓑ
R6	7030003620	S.RESISTOR	ERJ3GEYJ 333 V (33 kΩ)	
R7	7030003520	S.RESISTOR	ERJ3GEYJ 472 V (4.7 kΩ)	
R8	7030003280	S.RESISTOR	ERJ3GEYJ 470 V (47 Ω)	Ⓑ
	7030003320	S.RESISTOR	ERJ3GEYJ 101 V (100 Ω)	Ⓐ
R9	7030003620	S.RESISTOR	ERJ3GEYJ 333 V (33 kΩ)	
R10	7030003520	S.RESISTOR	ERJ3GEYJ 472 V (4.7 kΩ)	
R11	7030003200	S.RESISTOR	ERJ3GEYJ 100 V (10 Ω)	
R12	7030003570	S.RESISTOR	ERJ3GEYJ 123 V (12 kΩ)	
R13	7030003360	S.RESISTOR	ERJ3GEYJ 221 V (220 Ω)	
R14	7030003440	S.RESISTOR	ERJ3GEYJ 102 V (1 kΩ)	
R15	7030003650	S.RESISTOR	ERJ3GEYJ 563 V (56 kΩ)	
R16	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)	
R17	7030003320	S.RESISTOR	ERJ3GEYJ 101 V (100 Ω)	
R18	7030003520	S.RESISTOR	ERJ3GEYJ 472 V (4.7 kΩ)	
R19	7030003320	S.RESISTOR	ERJ3GEYJ 101 V (100 Ω)	
R20	7030003640	S.RESISTOR	ERJ3GEYJ 473 V (47 kΩ)	
R21	7030003260	S.RESISTOR	ERJ3GEYJ 330 V (33 Ω)	
R22	7030003360	S.RESISTOR	ERJ3GEYJ 221 V (220 Ω)	
R23	7030003660	S.RESISTOR	ERJ3GEYJ 683 V (68 kΩ)	
R24	7030003320	S.RESISTOR	ERJ3GEYJ 101 V (100 Ω)	
R25	7030003380	S.RESISTOR	ERJ3GEYJ 331 V (330 Ω)	
R26	7030003660	S.RESISTOR	ERJ3GEYJ 683 V (68 kΩ)	
R27	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)	
R28	7030003490	S.RESISTOR	ERJ3GEYJ 272 V (2.7 kΩ)	
R29	7030003500	S.RESISTOR	ERJ3GEYJ 332 V (3.3 kΩ)	
R30	7030003380	S.RESISTOR	ERJ3GEYJ 331 V (330 Ω)	
R31	7030003500	S.RESISTOR	ERJ3GEYJ 332 V (3.3 kΩ)	
R32	7030003500	S.RESISTOR	ERJ3GEYJ 332 V (3.3 kΩ)	
R33	7030003360	S.RESISTOR	ERJ3GEYJ 221 V (220 Ω)	
R34	7030003690	S.RESISTOR	ERJ3GEYJ 124 V (120 kΩ)	
R35	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)	
R36	7030003590	S.RESISTOR	ERJ3GEYJ 183 V (18 kΩ)	
R37	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)	
R38	7030003600	S.RESISTOR	ERJ3GEYJ 223 V (22 kΩ)	
R39	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)	
R40	7030003540	S.RESISTOR	ERJ3GEYJ 682 V (6.8 kΩ)	
R41	7030003510	S.RESISTOR	ERJ3GEYJ 392 V (3.9 kΩ)	
R42	7030003440	S.RESISTOR	ERJ3GEYJ 102 V (1 kΩ)	
R43	7030003640	S.RESISTOR	ERJ3GEYJ 473 V (47 kΩ)	
R44	7030003440	S.RESISTOR	ERJ3GEYJ 102 V (1 kΩ)	
R45	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)	
R46	7030003450	S.RESISTOR	ERJ3GEYJ 122 V (1.2 kΩ)	
R47	7030003280	S.RESISTOR	ERJ3GEYJ 470 V (47 Ω)	
R48	7030003670	S.RESISTOR	ERJ3GEYJ 823 V (82 kΩ)	
R49	7030003640	S.RESISTOR	ERJ3GEYJ 473 V (47 kΩ)	
R50	7030003650	S.RESISTOR	ERJ3GEYJ 563 V (56 kΩ)	
R51	7030003640	S.RESISTOR	ERJ3GEYJ 473 V (47 kΩ)	
R52	7410000950	S.ARRAY	EXB-V8V 102JV	
R53	7030003280	S.RESISTOR	ERJ3GEYJ 470 V (47 Ω)	
R54	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)	
R55	7030003480	S.RESISTOR	ERJ3GEYJ 222 V (2.2 kΩ)	
R56	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)	

[MAIN UNIT]

REF NO.	ORDER NO.	DESCRIPTION	
R57	7030003660	S.RESISTOR	ERJ3GEYJ 683 V (68 kΩ)
R58	7030003700	S.RESISTOR	ERJ3GEYJ 154 V (150 kΩ)
R59	7030003690	S.RESISTOR	ERJ3GEYJ 124 V (120 kΩ)
R60	7030003320	S.RESISTOR	ERJ3GEYJ 101 V (100 Ω)
R61	7030003440	S.RESISTOR	ERJ3GEYJ 102 V (1 kΩ)
R62	7030003720	S.RESISTOR	ERJ3GEYJ 224 V (220 kΩ)
R63	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)
R64	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)
R65	7030003720	S.RESISTOR	ERJ3GEYJ 224 V (220 kΩ)
R66	7030003650	S.RESISTOR	ERJ3GEYJ 563 V (56 kΩ)
R68	7030003380	S.RESISTOR	ERJ3GEYJ 331 V (330 Ω)
R69	7030003280	S.RESISTOR	ERJ3GEYJ 470 V (47 Ω)
R70	7030003720	S.RESISTOR	ERJ3GEYJ 224 V (220 kΩ)
R71	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)
R72	7030003720	S.RESISTOR	ERJ3GEYJ 224 V (220 kΩ)
R73	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)
R74	7030003720	S.RESISTOR	ERJ3GEYJ 224 V (220 kΩ)
R75	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)
R76	7030003520	S.RESISTOR	ERJ3GEYJ 472 V (4.7 kΩ)
R77	7030003440	S.RESISTOR	ERJ3GEYJ 102 V (1 kΩ)
R78	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)
R79	7030003400	S.RESISTOR	ERJ3GEYJ 471 V (470 Ω)
R80	7030003210	S.RESISTOR	ERJ3GEYJ 120 V (12 Ω)
R81	7030003400	S.RESISTOR	ERJ3GEYJ 471 V (470 Ω)
R82	7030003640	S.RESISTOR	ERJ3GEYJ 473 V (47 kΩ)
R83	7030003320	S.RESISTOR	ERJ3GEYJ 101 V (100 Ω)
R84	7030003440	S.RESISTOR	ERJ3GEYJ 102 V (1 kΩ)
R85	7030004050	S.RESISTOR	ERJ3GEYJ 1R0 V (1 Ω)
R86	7030003360	S.RESISTOR	ERJ3GEYJ 221 V (220 Ω)
R87	7030003490	S.RESISTOR	ERJ3GEYJ 272 V (2.7 kΩ)
R88	7030003350	S.RESISTOR	ERJ3GEYJ 181 V (180 Ω)
R89	7030003440	S.RESISTOR	ERJ3GEYJ 102 V (1 kΩ)
R90	7030003690	S.RESISTOR	ERJ3GEYJ 124 V (120 kΩ)
R91	7030003400	S.RESISTOR	ERJ3GEYJ 471 V (470 Ω)
R92	7030003470	S.RESISTOR	ERJ3GEYJ 182 V (1.8 kΩ)
R93	7030003380	S.RESISTOR	ERJ3GEYJ 331 V (330 Ω)
R94	7030003280	S.RESISTOR	ERJ3GEYJ 470 V (47 Ω)
R95	7030003340	S.RESISTOR	ERJ3GEYJ 151 V (150 Ω)
R96	7030003450	S.RESISTOR	ERJ3GEYJ 122 V (1.2 kΩ)
R97	7030003780	S.RESISTOR	ERJ3GEYJ 684 V (680 kΩ)
R98	7030003640	S.RESISTOR	ERJ3GEYJ 473 V (47 kΩ)
R99	7030003450	S.RESISTOR	ERJ3GEYJ 122 V (1.2 kΩ)
R100	7030003600	S.RESISTOR	ERJ3GEYJ 223 V (22 kΩ)
R101	7030003590	S.RESISTOR	ERJ3GEYJ 183 V (18 kΩ)
R102	7030003200	S.RESISTOR	ERJ3GEYJ 100 V (10 Ω)
R103	7030003260	S.RESISTOR	ERJ3GEYJ 330 V (33 Ω)
R104	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)
R105	7030003490	S.RESISTOR	ERJ3GEYJ 272 V (2.7 kΩ)
R106	7030003500	S.RESISTOR	ERJ3GEYJ 332 V (3.3 kΩ)
R107	7030003440	S.RESISTOR	ERJ3GEYJ 102 V (1 kΩ)
R109	7030003660	S.RESISTOR	ERJ3GEYJ 683 V (68 kΩ)
R110	7030004910	S.RESISTOR	ERJ3GEYF 332 V (3.3 kΩ)
R111	7030003590	S.RESISTOR	ERJ3GEYJ 183 V (18 kΩ)
R112	7030004730	S.RESISTOR	ERJ3GEYF 222 V (2.2 kΩ)
R113	7030003400	S.RESISTOR	ERJ3GEYJ 471 V (470 Ω)
R114	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)
R115	7030003690	S.RESISTOR	ERJ3GEYJ 124 V (120 kΩ)
R116	7030003620	S.RESISTOR	ERJ3GEYJ 333 V (33 kΩ)
R117	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)
R118	7030003720	S.RESISTOR	ERJ3GEYJ 224 V (220 kΩ)
R119	7030003700	S.RESISTOR	ERJ3GEYJ 154 V (150 kΩ)
R120	7030003630	S.RESISTOR	ERJ3GEYJ 393 V (39 kΩ)
R121	7030003540	S.RESISTOR	ERJ3GEYJ 682 V (6.8 kΩ)
R122	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)
R123	7030003690	S.RESISTOR	ERJ3GEYJ 124 V (120 kΩ)
R124	7030003610	S.RESISTOR	ERJ3GEYJ 273 V (27 kΩ)
R125	7030003800	S.RESISTOR	ERJ3GEYJ 105 V (1 MΩ)
R126	7030004050	S.RESISTOR	ERJ3GEYJ 1R0 V (1 Ω)
R127	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)
R128	7030003640	S.RESISTOR	ERJ3GEYJ 473 V (47 kΩ)
R129	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)
R130	7030003570	S.RESISTOR	ERJ3GEYJ 123 V (12 kΩ)
R131	7030003530	S.RESISTOR	ERJ3GEYJ 562 V (5.6 kΩ)
R132	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)
R133	7030003570	S.RESISTOR	ERJ3GEYJ 123 V (12 kΩ)
R134	7030003520	S.RESISTOR	ERJ3GEYJ 472 V (4.7 kΩ)
R136	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)
R137	7030003710	S.RESISTOR	ERJ3GEYJ 184 V (180 kΩ)
R138	7030003400	S.RESISTOR	ERJ3GEYJ 471 V (470 Ω)
R139	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)
R140	7030003580	S.RESISTOR	ERJ3GEYJ 153 V (15 kΩ)
R141	7030003400	S.RESISTOR	ERJ3GEYJ 471 V (470 Ω)

Ⓐ: [F21], [F21BR], [F21GM], [F21S] Ⓑ: [F22], [F22S], [F22SR] Ⓒ: [F21BR], [F21GM], [F22SR]
Ⓓ: [F21], [F21S], [F22], [F22S] Ⓔ: [F21BR], [F21S], [F22S] Ⓕ: [F21GM], [F21], [F22], [F22SR]

S.=Surface mount

[MAIN UNIT]

REF NO.	ORDER NO.	DESCRIPTION	
R142	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)
R143	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ) Ⓓ only
R145	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ) Ⓒ only
R146	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)
R147	7410000950	S.ARRAY	EXB-V8V 102JV
R148	7410000950	S.ARRAY	EXB-V8V 102JV
R149	7410000950	S.ARRAY	EXB-V8V 102JV
R151	7510001280	S.THERMISTOR	NTCCM20124AG473J-T
R152	7030003940	S.RESISTOR	ERJ3GEYF 104 V (100 kΩ)
R153	7030003940	S.RESISTOR	ERJ3GEYF 104 V (100 kΩ)
R154	7030003940	S.RESISTOR	ERJ3GEYF 104 V (100 kΩ)
R155	7030003200	S.RESISTOR	ERJ3GEYJ 100 V (10 Ω)
R156	7030003800	S.RESISTOR	ERJ3GEYJ 105 V (1 MΩ)
R157	7030003570	S.RESISTOR	ERJ3GEYJ 123 V (12 kΩ)
R158	7030003570	S.RESISTOR	ERJ3GEYJ 123 V (12 kΩ)
R159	7030003570	S.RESISTOR	ERJ3GEYJ 123 V (12 kΩ)
R160	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)
R161	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)
R163	7410000950	S.ARRAY	EXB-V8V 102JV
R164	7410000950	S.ARRAY	EXB-V8V 102JV
R165	7030003400	S.RESISTOR	ERJ3GEYJ 471 V (470 Ω)
R166	7030003760	S.RESISTOR	ERJ3GEYJ 474 V (470 kΩ)
R167	7030003760	S.RESISTOR	ERJ3GEYJ 474 V (470 kΩ)
R168	7030003760	S.RESISTOR	ERJ3GEYJ 474 V (470 kΩ)
R169	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)
R170	7030003480	S.RESISTOR	ERJ3GEYJ 222 V (2.2 kΩ)
R171	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)
R172	7030003520	S.RESISTOR	ERJ3GEYJ 472 V (4.7 kΩ)
R173	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)
R174	7030003520	S.RESISTOR	ERJ3GEYJ 472 V (4.7 kΩ)
R175	7030003620	S.RESISTOR	ERJ3GEYJ 333 V (33 kΩ)
R176	7030003600	S.RESISTOR	ERJ3GEYJ 223 V (22 kΩ)
R177	7030003600	S.RESISTOR	ERJ3GEYJ 223 V (22 kΩ)
R178	7030003650	S.RESISTOR	ERJ3GEYJ 563 V (56 kΩ)
R179	7030003710	S.RESISTOR	ERJ3GEYJ 184 V (180 kΩ)
R180	7030003640	S.RESISTOR	ERJ3GEYJ 473 V (47 kΩ)
R181	7030003640	S.RESISTOR	ERJ3GEYJ 473 V (47 kΩ)
R182	7030003640	S.RESISTOR	ERJ3GEYJ 473 V (47 kΩ)
R184	7030003640	S.RESISTOR	ERJ3GEYJ 473 V (47 kΩ)
R185	7030003610	S.RESISTOR	ERJ3GEYJ 273 V (27 kΩ)
R186	7030003700	S.RESISTOR	ERJ3GEYJ 154 V (150 kΩ)
R187	7030003400	S.RESISTOR	ERJ3GEYJ 471 V (470 Ω)
R188	7030003760	S.RESISTOR	ERJ3GEYJ 474 V (470 kΩ)
R189	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)
R190	7030003640	S.RESISTOR	ERJ3GEYJ 473 V (47 kΩ)
R191	7030003640	S.RESISTOR	ERJ3GEYJ 473 V (47 kΩ)
R192	7030003590	S.RESISTOR	ERJ3GEYJ 183 V (18 kΩ)
R193	7030003720	S.RESISTOR	ERJ3GEYJ 224 V (220 kΩ)
R194	7030003660	S.RESISTOR	ERJ3GEYJ 683 V (68 kΩ)
R195	7030003690	S.RESISTOR	ERJ3GEYJ 124 V (120 kΩ)
R196	7030003600	S.RESISTOR	ERJ3GEYJ 223 V (22 kΩ)
R197	7030003600	S.RESISTOR	ERJ3GEYJ 223 V (22 kΩ)
R198	7030003600	S.RESISTOR	ERJ3GEYJ 223 V (22 kΩ)
R199	7030003640	S.RESISTOR	ERJ3GEYJ 473 V (47 kΩ)
R200	7410000770	S.ARRAY	EXB-V4V 102JV (1 kΩ)
R201	7410000950	S.ARRAY	EXB-V8V 102JV
R202	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)
R203	7030003460	S.RESISTOR	ERJ3GEYJ 152 V (1.5 kΩ)
R204	7030003750	S.RESISTOR	ERJ3GEYJ 394 V (390 kΩ)
R205	7030003710	S.RESISTOR	ERJ3GEYJ 184 V (180 kΩ)
R206	7030003670	S.RESISTOR	ERJ3GEYJ 823 V (82 kΩ)
R207	7030003630	S.RESISTOR	ERJ3GEYJ 393 V (39 kΩ)
R208	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)
R209	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)
R210	7030003690	S.RESISTOR	ERJ3GEYJ 124 V (120 kΩ)
R211	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)
R212	7030003580	S.RESISTOR	ERJ3GEYJ 153 V (15 kΩ)
R213	7030003400	S.RESISTOR	ERJ3GEYJ 471 V (470 Ω)
R214	7030003440	S.RESISTOR	ERJ3GEYJ 102 V (1 kΩ)
R215	7030003600	S.RESISTOR	ERJ3GEYJ 223 V (22 kΩ)
R216	7030003600	S.RESISTOR	ERJ3GEYJ 223 V (22 kΩ)
R217	7030003640	S.RESISTOR	ERJ3GEYJ 473 V (47 kΩ)
R218	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)
R219	7030003720	S.RESISTOR	ERJ3GEYJ 224 V (220 kΩ)
R220	7030003480	S.RESISTOR	ERJ3GEYJ 222 V (2.2 kΩ)
R221	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)
R222	7030003660	S.RESISTOR	ERJ3GEYJ 683 V (68 kΩ)
R223	7030003660	S.RESISTOR	ERJ3GEYJ 683 V (68 kΩ)
R224	7030003660	S.RESISTOR	ERJ3GEYJ 683 V (68 kΩ)
R225	7030003660	S.RESISTOR	ERJ3GEYJ 683 V (68 kΩ)
R226	7030003660	S.RESISTOR	ERJ3GEYJ 683 V (68 kΩ)
R227	7030003710	S.RESISTOR	ERJ3GEYJ 184 V (180 kΩ)

[MAIN UNIT]

REF NO.	ORDER NO.	DESCRIPTION	
R228	7030003760	S.RESISTOR	ERJ3GEYJ 474 V (470 kΩ)
R229	7030003470	S.RESISTOR	ERJ3GEYJ 182 V (1.8 kΩ)
R232	7030003700	S.RESISTOR	ERJ3GEYJ 154 V (150 kΩ)
R233	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)
R234	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)
R238	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)
R239	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)
R240	7030003670	S.RESISTOR	ERJ3GEYJ 823 V (82 kΩ)
R241	7030003440	S.RESISTOR	ERJ3GEYJ 102 V (1 kΩ)
R242	7030003500	S.RESISTOR	ERJ3GEYJ 332 V (3.3 kΩ)
R243	7030003440	S.RESISTOR	ERJ3GEYJ 102 V (1 kΩ)
R244	7030003240	S.RESISTOR	ERJ3GEYJ 220 V (22 Ω)
R245	7030003320	S.RESISTOR	ERJ3GEYJ 101 V (100 Ω)
C2	4030009510	S.CERAMIC	C1608 CH 1H 010B-T-A Ⓑ only
C3	4030006980	S.CERAMIC	C1608 CH 1H 070D-T-A
C5	4030009910	S.CERAMIC	C1608 CH 1H 040B-T-A
C6	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C7	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C8	4030007090	S.CERAMIC	C1608 CH 1H 470J-T-A
C9	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C12	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C13	4030007020	S.CERAMIC	C1608 CH 1H 120J-T-A except [F22SR]
	4030007040	S.CERAMIC	C1608 CH 1H 180J-T-A [F22SR] only
C14	4030007010	S.CERAMIC	C1608 CH 1H 100D-T-A except [F22SR]
	4030011770	S.CERAMIC	C1608 CH 1H 060B-T-A [F22SR] only
C15	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C17	4030008750	S.CERAMIC	C1608 CH 1H 360J-T-A except [F22SR]
C18	4030007090	S.CERAMIC	C1608 CH 1H 470J-T-A
C20	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C21	4030006900	S.CERAMIC	C1608 JB 1H 103K-T-A
C23	4030009990	S.CERAMIC	C1608 CH 1H 200J-T-A
C24	4030007070	S.CERAMIC	C1608 CH 1H 330J-T-A [F22SR] only
	4030007080	S.CERAMIC	C1608 CH 1H 390J-T-A except [F22SR]
C25	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C26	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C27	4030006850	S.CERAMIC	C1608 JB 1H 471K-T-A
C28	4030009920	S.CERAMIC	C1608 CH 1H 050B-T-A
C29	4030007020	S.CERAMIC	C1608 CH 1H 120J-T-A
C30	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C31	4030006850	S.CERAMIC	C1608 JB 1H 471K-T-A
C33	4030007010	S.CERAMIC	C1608 CH 1H 100D-T-A
C34	4030007090	S.CERAMIC	C1608 CH 1H 470J-T-A
C35	4030007090	S.CERAMIC	C1608 CH 1H 470J-T-A
C36	4030007010	S.CERAMIC	C1608 CH 1H 100D-T-A Ⓐ
	4030009910	S.CERAMIC	C1608 CH 1H 040B-T-A Ⓑ
C37	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C38	4030009920	S.CERAMIC	C1608 CH 1H 050B-T-A
C39	4030009920	S.CERAMIC	C1608 CH 1H 050B-T-A
C40	4030006850	S.CERAMIC	C1608 JB 1H 471K-T-A
C41	4030007020	S.CERAMIC	C1608 CH 1H 120J-T-A
C42	4030007020	S.CERAMIC	C1608 CH 1H 120J-T-A
C43	4030006850	S.CERAMIC	C1608 JB 1H 471K-T-A
C44	4030009530	S.CERAMIC	C1608 CH 1H 030B-T-A
C45	4030007090	S.CERAMIC	C1608 CH 1H 470J-T-A
C46	4030006850	S.CERAMIC	C1608 JB 1H 471K-T-A
C47	4030007090	S.CERAMIC	C1608 CH 1H 470J-T-A
C48	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C49	4030009500	S.CERAMIC	C1608 CH 1H 0R5B-T-A
C50	4030006980	S.CERAMIC	C1608 CH 1H 070D-T-A
C51	4030006990	S.CERAMIC	C1608 CH 1H 080D-T-A
C52	4030009910	S.CERAMIC	C1608 CH 1H 040B-T-A
C53	4030009910	S.CERAMIC	C1608 CH 1H 040B-T-A
C54	4540000040	S.TRIMMER	ECR-KN006 A61X
C55	4030006980	S.CERAMIC	C1608 CH 1H 070D-T-A
C56	4550006450	S.TANTALUM	ECST1EY105R
C57	4030007090	S.CERAMIC	C1608 CH 1H 470J-T-A
C58	4510004630	S.ELECTROLYTIC	ECEV1CA100SR
C59	4030007090	S.CERAMIC	C1608 CH 1H 470J-T-A
C60	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C61	4030007090	S.CERAMIC	C1608 CH 1H 470J-T-A
C62	4030009500	S.CERAMIC	C1608 CH 1H 0R5B-T-A
C63	4030009920	S.CERAMIC	C1608 CH 1H 050B-T-A

Ⓐ: [F21], [F21BR], [F21GM], [F21S] Ⓑ: [F22], [F22S], [F22SR] Ⓒ: [F21BR], [F21GM], [F22SR] S.=Surface mount
Ⓓ: [F21], [F21S], [F22], [F22S] Ⓔ: [F21BR], [F21S], [F22S] Ⓕ: [F21GM], [F21], [F22], [F22SR]

[MAIN UNIT]

REF NO.	ORDER NO.	DESCRIPTION	
C64	4030007010	S.CERAMIC	C1608 CH 1H 100D-T-A
C65	4030009920	S.CERAMIC	C1608 CH 1H 050B-T-A
C66	4030009540	S.CERAMIC	C1608 CH 1H 1R5B-T-A
C67	4030009570	S.CERAMIC	C1608 CH 1H 0R3B-T-A
C68	4540000040	S.TRIMMER	ECR-KN006 A61X
C69	4030009920	S.CERAMIC	C1608 CH 1H 050B-T-A
C70	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C71	4030012600	S.CERAMIC	C2012 JB 1A 105M-T-A
C72	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C73	4030007090	S.CERAMIC	C1608 CH 1H 470J-T-A
C74	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C75	4550006360	S.TANTALUM	ECST1VY104R
C76	4550006450	S.TANTALUM	ECST1EY105R
C77	4030008920	S.CERAMIC	C1608 JB 1H 473K-T-A
C78	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C80	4030007090	S.CERAMIC	C1608 CH 1H 470J-T-A
C81	4030007130	S.CERAMIC	C1608 CH 1H 101J-T-A
C82	4030008630	S.CERAMIC	C1608 JF 1H 104Z-T-A
C83	4030007130	S.CERAMIC	C1608 CH 1H 101J-T-A
C84	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C85	4510005860	S.ELECTROLYTIC	ECEV1HA2R2SR
C86	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C87	4030007090	S.CERAMIC	C1608 CH 1H 470J-T-A
C88	4030011600	S.CERAMIC	C1608 JB 1E 104K-T-N
C89	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C90	4030011770	S.CERAMIC	C1608 CH 1H 060B-T-A
C91	4030011770	S.CERAMIC	C1608 CH 1H 060B-T-A
C92	4030008630	S.CERAMIC	C1608 JF 1H 104Z-T-A
C93	4030007090	S.CERAMIC	C1608 CH 1H 470J-T-A
C94	4030007090	S.CERAMIC	C1608 CH 1H 470J-T-A
C96	4030011600	S.CERAMIC	C1608 JB 1E 104K-T-N
C97	4030011600	S.CERAMIC	C1608 JB 1E 104K-T-N
C98	4030006900	S.CERAMIC	C1608 JB 1H 103K-T-A
C99	4030007000	S.CERAMIC	C1608 CH 1H 090D-T-A
C100	4030006990	S.CERAMIC	C1608 CH 1H 080D-T-A
C102	4030009540	S.CERAMIC	C1608 CH 1H 1R5B-T-A
C103	4030007090	S.CERAMIC	C1608 CH 1H 470J-T-A
C104	4030006980	S.CERAMIC	C1608 CH 1H 070D-T-A
C105	4030009530	S.CERAMIC	C1608 CH 1H 030B-T-A
C106	4030009530	S.CERAMIC	C1608 CH 1H 030B-T-A
C107	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C108	4030007090	S.CERAMIC	C1608 CH 1H 470J-T-A
C109	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C110	4030007090	S.CERAMIC	C1608 CH 1H 470J-T-A
C111	4030009920	S.CERAMIC	C1608 CH 1H 050B-T-A
C112	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C113	4030006990	S.CERAMIC	C1608 CH 1H 080D-T-A
C114	4030007090	S.CERAMIC	C1608 CH 1H 470J-T-A
C115	4030009570	S.CERAMIC	C1608 CH 1H 0R3B-T-A
C116	4030011770	S.CERAMIC	C1608 CH 1H 060B-T-A
C117	4030006990	S.CERAMIC	C1608 CH 1H 080D-T-A
C118	4030007090	S.CERAMIC	C1608 CH 1H 470J-T-A
C119	4030009500	S.CERAMIC	C1608 CH 1H 0R5B-T-A
C120	4030006990	S.CERAMIC	C1608 CH 1H 080D-T-A
C121	4030007090	S.CERAMIC	C1608 CH 1H 470J-T-A
C122	4030009920	S.CERAMIC	C1608 CH 1H 050B-T-A
C123	4030007050	S.CERAMIC	C1608 CH 1H 220J-T-A
C124	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C125	4030007010	S.CERAMIC	C1608 CH 1H 100D-T-A
C126	4030009920	S.CERAMIC	C1608 CH 1H 050B-T-A
C127	4030007090	S.CERAMIC	C1608 CH 1H 470J-T-A
C128	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C129	4030007020	S.CERAMIC	C1608 CH 1H 120J-T-A
C130	4030006900	S.CERAMIC	C1608 JB 1H 103K-T-A
C132	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C133	4030009920	S.CERAMIC	C1608 CH 1H 050B-T-A
C134	4030009990	S.CERAMIC	C1608 CH 1H 200J-T-A
C136	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C137	4030007130	S.CERAMIC	C1608 CH 1H 101J-T-A
C138	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C139	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C140	4030007140	S.CERAMIC	C1608 CH 1H 121J-T-A
C142	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C143	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C144	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C145	4030008680	S.CERAMIC	C2012 JF 1C 105Z-T-A
C146	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C147	4030011600	S.CERAMIC	C1608 JB 1E 104K-T-N
C148	4030009530	S.CERAMIC	C1608 CH 1H 030B-T-A
C149	4030006980	S.CERAMIC	C1608 CH 1H 070D-T-A
C150	4030009910	S.CERAMIC	C1608 CH 1H 040B-T-A
C151	4030007100	S.CERAMIC	C1608 CH 1H 560J-T-A

[MAIN UNIT]

REF NO.	ORDER NO.	DESCRIPTION	
C152	4030007010	S.CERAMIC	C1608 CH 1H 100D-T-A
C153	4030006900	S.CERAMIC	C1608 JB 1H 103K-T-A
C154	4030007170	S.CERAMIC	C1608 CH 1H 221J-T-A
C155	4030007170	S.CERAMIC	C1608 CH 1H 221J-T-A
C156	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C157	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C158	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C159	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C160	4510004640	S.ELECTROLYTIC	ECEV1CA470SP
C161	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C162	4030006850	S.CERAMIC	C1608 JB 1H 471K-T-A
C163	4510006940	S.ELECTROLYTIC	EEVFC0J101P
C164	4030008920	S.CERAMIC	C1608 JB 1H 473K-T-A
C165	4030007090	S.CERAMIC	C1608 CH 1H 470J-T-A
C166	4550006700	S.TANTALUM	ECST1AY106R
C167	4030008920	S.CERAMIC	C1608 JB 1H 473K-T-A
C168	4030009660	S.CERAMIC	C1608 JF 1C 224Z-T-A
C169	4550006650	S.TANTALUM	ECST1CY685R
C170	4030008630	S.CERAMIC	C1608 JF 1H 104Z-T-A
C171	4030009660	S.CERAMIC	C1608 JF 1C 224Z-T-A
C172	4510006090	S.ELECTROLYTIC	ECEV0GA470SR
C173	4030011600	S.CERAMIC	C1608 JB 1E 104K-T-N
C174	4030007160	S.CERAMIC	C1608 CH 1H 181J-T-A
C175	4030008770	S.CERAMIC	C1608 JB 1H 562K-T-A
C176	4030008650	S.CERAMIC	C1608 JB 1H 332K-T-A
C177	4550006170	S.TANTALUM	ECST1AY225R
C178	4030006900	S.CERAMIC	C1608 JB 1H 103K-T-A
C179	4030008680	S.CERAMIC	C2012 JF 1C 105Z-T-A
C180	4030006870	S.CERAMIC	C1608 JB 1H 222K-T-A
C181	4030008920	S.CERAMIC	C1608 JB 1H 473K-T-A
C182	4030008920	S.CERAMIC	C1608 JB 1H 473K-T-A
C183	4030011600	S.CERAMIC	C1608 JB 1E 104K-T-N
C184	4030007160	S.CERAMIC	C1608 CH 1H 181J-T-A
C185	4030011600	S.CERAMIC	C1608 JB 1E 104K-T-N
C186	4030008770	S.CERAMIC	C1608 JB 1H 562K-T-A
C187	4030008880	S.CERAMIC	C1608 JB 1H 223K-T-A
C188	4510004630	S.ELECTROLYTIC	ECEV1CA100SR
C189	4030006850	S.CERAMIC	C1608 JB 1H 471K-T-A
C190	4030008630	S.CERAMIC	C1608 JF 1H 104Z-T-A
C191	4030008630	S.CERAMIC	C1608 JF 1H 104Z-T-A
C192	4030008630	S.CERAMIC	C1608 JF 1H 104Z-T-A
C193	4030007050	S.CERAMIC	C1608 CH 1H 220J-T-A
C194	4030007030	S.CERAMIC	C1608 CH 1H 150J-T-A
C195	4030007110	S.CERAMIC	C1608 CH 1H 680J-T-A
C196	4030006850	S.CERAMIC	C1608 JB 1H 471K-T-A
C197	4510005430	S.ELECTROLYTIC	ECEV0JA220SR
C198	4030008630	S.CERAMIC	C1608 JF 1H 104Z-T-A
C199	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C200	4030008890	S.CERAMIC	C1608 JB 1H 273K-T-A
C201	4030007090	S.CERAMIC	C1608 CH 1H 470J-T-A
C202	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C203	4030006900	S.CERAMIC	C1608 JB 1H 103K-T-A
C204	4030006900	S.CERAMIC	C1608 JB 1H 103K-T-A
C205	4030008630	S.CERAMIC	C1608 JF 1H 104Z-T-A
C206	4550006200	S.TANTALUM	ECST0JY106R
C207	4510004630	S.ELECTROLYTIC	ECEV1CA100SR
C208	4030006900	S.CERAMIC	C1608 JB 1H 103K-T-A
C209	4030008630	S.CERAMIC	C1608 JF 1H 104Z-T-A
C210	4510005430	S.ELECTROLYTIC	ECEV0JA220SR
C211	4030006900	S.CERAMIC	C1608 JB 1H 103K-T-A
C212	4030006900	S.CERAMIC	C1608 JB 1H 103K-T-A
C213	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C214	4030007090	S.CERAMIC	C1608 CH 1H 470J-T-A
C215	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C216	4030006900	S.CERAMIC	C1608 JB 1H 103K-T-A
C218	4030009630	S.CERAMIC	C1608 JB 1H 822K-T-A
C219	4030011600	S.CERAMIC	C1608 JB 1E 104K-T-N
C220	4030009490	S.CERAMIC	C1608 JB 1H 821K-T-A
C222	4030008920	S.CERAMIC	C1608 JB 1H 473K-T-A
C223	4030007090	S.CERAMIC	C1608 CH 1H 470J-T-A
C224	4030008900	S.CERAMIC	C1608 JB 1H 333K-T-A
C225	4510004650	S.ELECTROLYTIC	ECEV1EA4R7SR
C226	4030011600	S.CERAMIC	C1608 JB 1E 104K-T-N
C227	4030006900	S.CERAMIC	C1608 JB 1H 103K-T-A
C228	4030011600	S.CERAMIC	C1608 JB 1E 104K-T-N
C229	4030009880	S.CERAMIC	C1608 JB 1H 682K-T-A
C230	4030006900	S.CERAMIC	C1608 JB 1H 103K-T-A
C231	4030008910	S.CERAMIC	C1608 JB 1H 393K-T-A
C232	4030008920	S.CERAMIC	C1608 JB 1H 473K-T-A
C233	4030011600	S.CERAMIC	C1608 JB 1E 104K-T-N
C234	4030009490	S.CERAMIC	C1608 JB 1H 821K-T-A
C235	4030009490	S.CERAMIC	C1608 JB 1H 821K-T-A

Ⓐ: [F21], [F21BR], [F21GM], [F21S] Ⓑ: [F22], [F22S], [F22SR] Ⓒ: [F21BR], [F21GM], [F22SR] S.=Surface mount
Ⓓ: [F21], [F21S], [F22], [F22S] Ⓔ: [F21BR], [F21S], [F22S] Ⓕ: [F21GM], [F21], [F22], [F22SR]

[MAIN UNIT]

REF NO.	ORDER NO.	DESCRIPTION		
C236	4030008880	S.CERAMIC	C1608 JB 1H 223K-T-A	
C237	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A	
C238	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A	
C239	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A	
C240	4030007090	S.CERAMIC	C1608 CH 1H 470J-T-A	
C242	4030008470	S.CERAMIC	C1608 JB 1H 272K-T-A	
C243	4030008770	S.CERAMIC	C1608 JB 1H 562K-T-A	
C244	4030007160	S.CERAMIC	C1608 CH 1H 181J-T-A	
C245	4030009630	S.CERAMIC	C1608 JB 1H 822K-T-A	
C246	4030007110	S.CERAMIC	C1608 CH 1H 680J-T-A	
C247	4030011600	S.CERAMIC	C1608 JB 1E 104K-T-N	
C248	4030011600	S.CERAMIC	C1608 JB 1E 104K-T-N	
C249	4030017480	S.CERAMIC	C1608 JB 1A 474K-T-N	
C251	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A	
C252	4030007130	S.CERAMIC	C1608 CH 1H 101J-T-A	
C253	4030007000	S.CERAMIC	C1608 CH 1H 090D-T-A	
C255	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A	
C257	4030011600	S.CERAMIC	C1608 JB 1E 104K-T-N	
C258	4030007090	S.CERAMIC	C1608 CH 1H 470J-T-A	
C259	4030006900	S.CERAMIC	C1608 JB 1H 103K-T-A	
C260	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A	
C261	4030007090	S.CERAMIC	C1608 CH 1H 470J-T-A	
J1	6910013720	CONNECTOR	IMSA-9230B-04Z120-T	Ⓕ only
J2	6910013730	CONNECTOR	IMSA-9230B-07Z120-T	
J3	6510021900	S.CONNECTOR	BM02B-ASRS-TF	
J4	6450001680	CONNECTOR	HSJ1122-010010	
J5	6450001690	CONNECTOR	HSJ1456-01-220	
J6	6510022690	S.CONNECTOR	06FLT-SM1-TB	[F22SR] only
J7	6510022370	S.CONNECTOR	IMSA-9178S-04Y901	[F22SR] only
MC1	7700002160	MICROPHON	KUC3523-040245	
S1	2230001060	S.SWITCH	EVQ-PUL 02K	
S2	2230001060	S.SWITCH	EVQ-PUL 02K	
S3	2230001060	S.SWITCH	EVQ-PUL 02K	
W2	7030003860	S.JUMPER	ERJ3GE JPW V	
W4	7030003860	S.JUMPER	ERJ3GE JPW V	
W8	7030003860	S.JUMPER	ERJ3GE JPW V	Ⓐ only
W12	7030003860	S.JUMPER	ERJ3GE JPW V	Ⓔ only
W13	7030003860	S.JUMPER	ERJ3GE JPW V	Ⓔ only
W14	7030003860	S.JUMPER	ERJ3GE JPW V	
EP1	0910053694	PCB	B 5601D	Ⓐ
	0910054182	PCB	B 5685B	Ⓑ
EP2	6910013370	S.BEAD	BLM11B221SB	
EP3	6910013370	S.BEAD	BLM11B221SB	
EP4	6910013370	S.BEAD	BLM11B221SB	
EP5	6910013370	S.BEAD	BLM11B221SB	
EP6	6910013370	S.BEAD	BLM11B221SB	
EP7	6910013370	S.BEAD	BLM11B221SB	Ⓔ only
EP8	6910013370	S.BEAD	BLM11B221SB	Ⓑ only
EP9	3310002940	ANTENNA	2458 ANT	[F22SR] only

Ⓐ: [F21], [F21BR], [F21GM], [F21S]
Ⓑ: [F22], [F22S], [F22SR]
Ⓒ: [F21BR], [F21GM], [F22SR]
Ⓓ: [F21], [F21S], [F22], [F22S]
Ⓔ: [F21BR], [F21S], [F22S]
Ⓕ: [F21GM], [F21], [F22], [F22SR]

S.=Surface mount

SECTION 7 MECHANICAL PARTS AND DISASSEMBLY

[CHASSIS PARTS]

REF. NO.	ODER NO.	DESCRIPTION	QTY.
SP1	2510001100	Speaker 036D0601	1
MP1	8210017710	2458 front panel	1
MP4	8930054680	2458 release button	1
MP6	8930054690	2458 lens	1
MP7	8210017730	2458 jack panel	1
MP8	8930054881	2458 plus terminal-1	1
MP9	8010018501	2458 chassis-1	1
MP10	8930054710	2458 A-main seal Ⓐ	1
	8930054720	2458 B-main seal Ⓑ	1
MP11	8930042350	1922 mic sheet	1
MP12	8930050840	2251 minus terminal	1
MP13	8830001550	Nut (J)	1
MP14	8830001570	Nut (K) Ⓑ	1
	8830001550	Nut (J) Ⓐ	1
MP15	8950005320	2337 contact	1
MP18	8610010910	Knob N-281	1
MP19	8610010920	Knob N-282 Ⓐ only	1
MP20	8810004860	Screw PH M 2 x 6 ZK	2
MP21	8810000100	Screw PH M 2 x 4 ZK	2
MP22	8810009560	Screw B0 M 2 x 6 ZK	2
MP26	8930053680	Spring (AG)	1
MP27	8210017090	2337 terminal holder	1
MP28	8930052840	2337 T-rubber	1
MP29	8810009510	B0 M 2 x 4 NI-ZU (BT)	10
MP30	8930043760	1923 Mic seal	1
MP32	8950004671	ANT connector 101A except [F22SR]	1
MP33	8830001250	ANT connector 101 nut	1
MP34	8930055110	2458 side plate	1
MP35	8810009510	Screw B0 M 2 x 4 NI-ZU (BT) Ⓑ only	1
MP39	8810009180	Screw B0 M 2 x 5 NI-ZU (BT)	1

Ⓐ: [F21], [F21GM], [F22] and [F22SR]
Ⓑ: [F21S], [F21BR] and [F22S]
Ⓒ: [F21], [F21S], [F22] and [F22S]
Ⓓ: [F21BR], [F21GM] and [F22SR]
Ⓔ: [F21BR], [F21GM] and [F21S] (For USA version)

Screw abbreviations B0, BT: Self-tapping
PH: Pan head
ZK: Black
NI-ZU: Nickel-zinc

[MAIN UNIT]

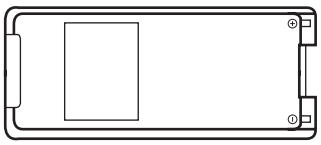
REF. NO.	ODER NO.	DESCRIPTION	QTY.
MP1	8510013000	2336 VCO case	1
MP2	8510011180	1923 VCO cover	1
MP6	8510014320	2458 main shield	1
MP7	8930055690	Sponge (GT)	1

[ACCESSORIES]

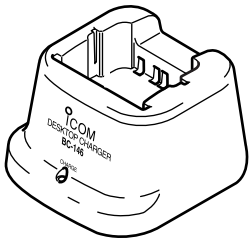
REF. NO.	ODER NO.	DESCRIPTION	QTY.
EP1	Optional product	Antenna FA-SC57U except [F22SR]	1
EP2	Optional product	Battery BP-209 Ⓒ	1
		Battery BP-222 Ⓓ	1
EP4	Optional product	BC-147A Ⓔ	1
		BC-147E [F22SR] only	1
EP5	Optional product	BC-146 ACC Ⓔ, [F22SR] only	1
MP1	Optional product	1922 Belt clip	1

EP1

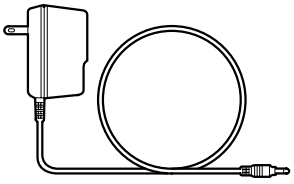
EP2



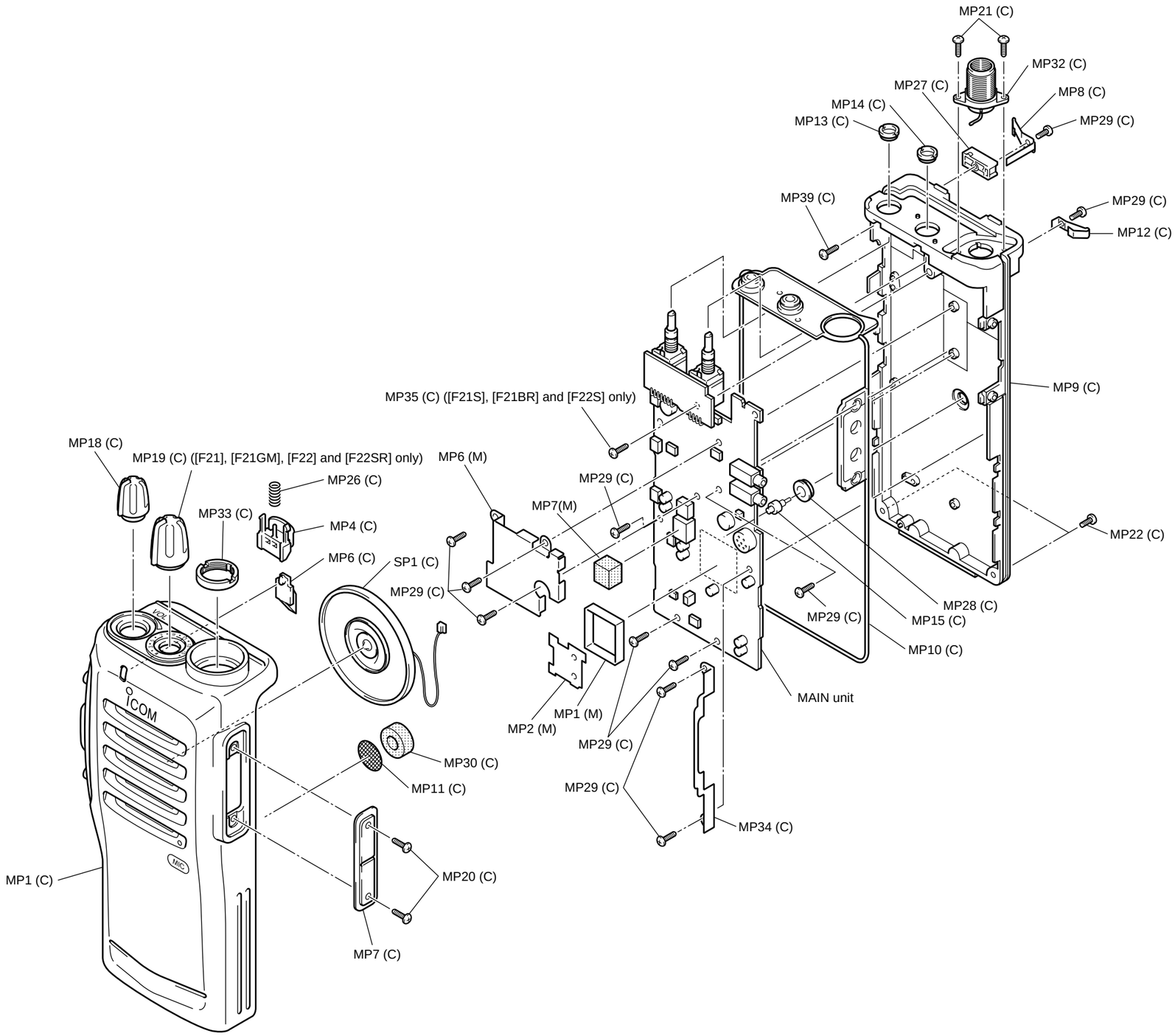
EP4



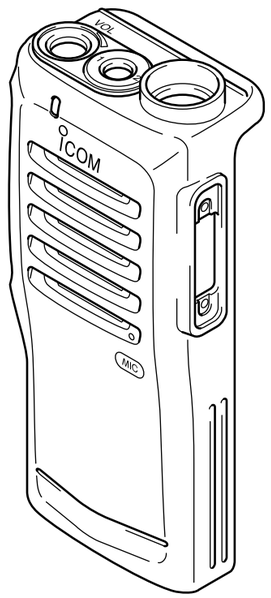
EP5



MP1



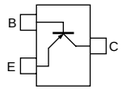
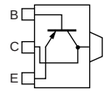
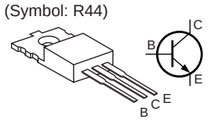
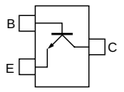
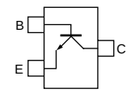
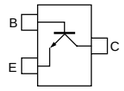
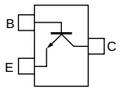
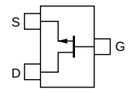
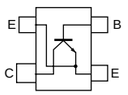
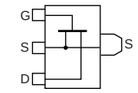
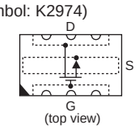
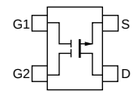
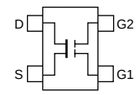
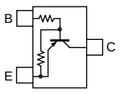
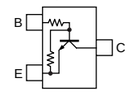
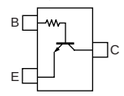
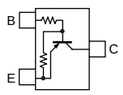
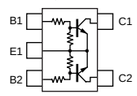
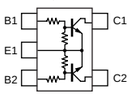
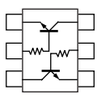
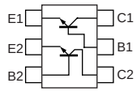
IC-F21S, F21BR, F22S



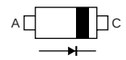
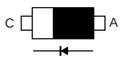
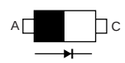
UNIT abbreviation (C): CHASSIS PARTS, (M): MAIN UNIT

SECTION 8 SEMI-CONDUCTOR INFORMATION

• TRANSISTOR AND FET'S

2SA1577 Q (Symbol: HQ) 	**2SB1132 R** (Symbol: BARB) 	**2SC3585 R44** (Symbol: R44) 	**2SC4116 GR** (Symbol: LG) 	**2SC4215 O** (Symbol: QO) 
2SC5085 Y (Symbol: MCY) 	**2SC5107 O** (Symbol: MFO) 	**2SK880 Y** (Symbol: XY) 	**2SK1829** (Symbol: K1) 	**2SK2973** (Symbol: K1) 
2SK2974 (Symbol: K2974) 	**3SK272** (Symbol: K) 	**3SK293** (Symbol: UF) 	**DTA144 EUA** (Symbol: 16) 	**DTC144 EUA** (Symbol: 26) 
DTC144 TU (Symbol: 06) 	**UN911 H** (Symbol: 6P) 	**XP1213** (Symbol: 9L) 	**XP1214** (Symbol: 9H) 	**XP4216** (Symbol: 8U) 
XP6501 AB (Symbol: 5N) 				

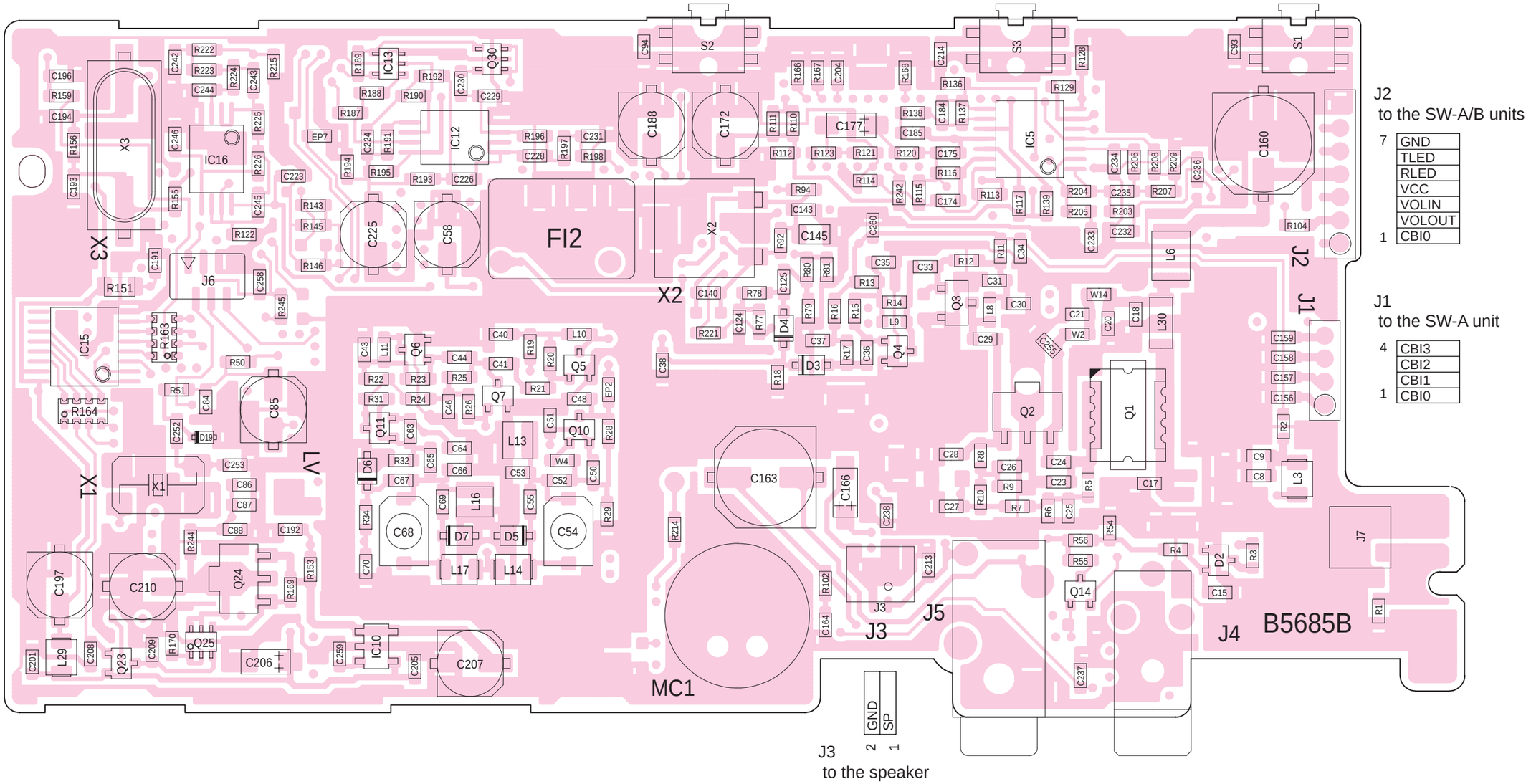
• DIODES

1SV307 (Symbol: TX) 	**HVU350 B** (Symbol: 4) 	**MA2S111** (Symbol: A) 	**MA368** (Symbol: 6L) 	**MA77** (Symbol: 4B) 
RB706F-40 (Symbol: 3J) 	**HVC362** (Symbol: V2) 			

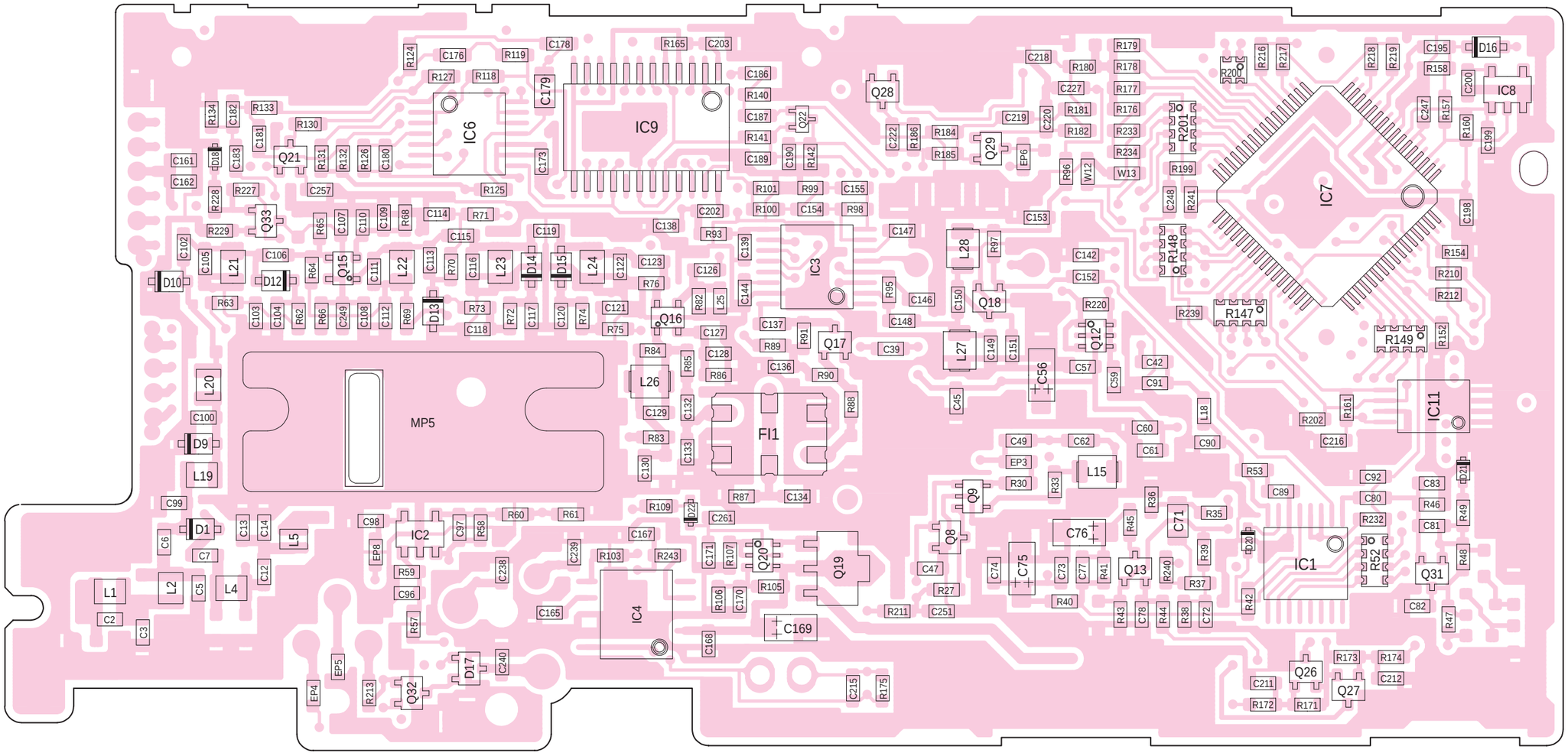
SECTION 9 BOARD LAYOUTS

9-1 IC-F22/F22S/F22SR MAIN UNIT

- **TOP VIEW**

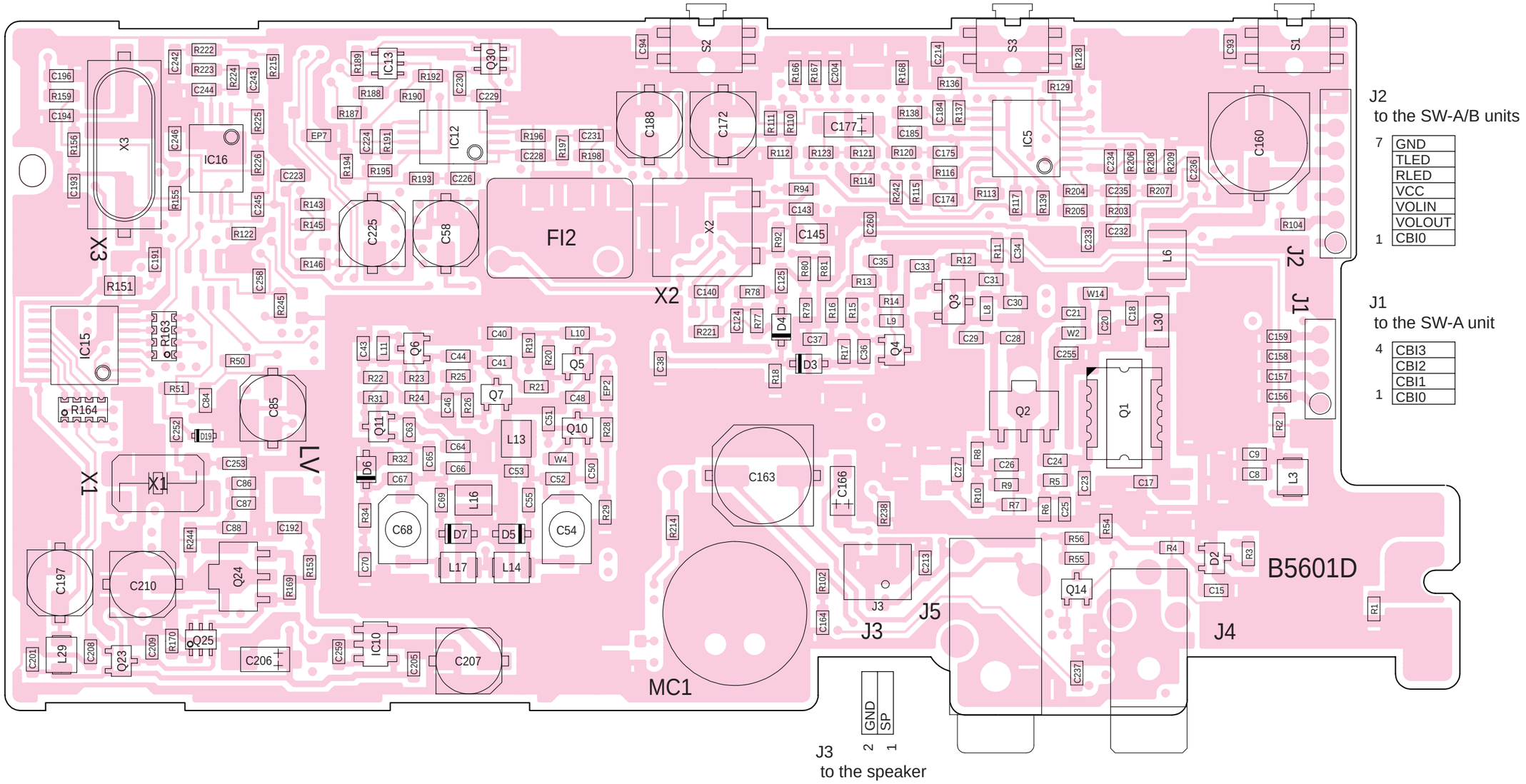


• **BOTTOM VIEW**

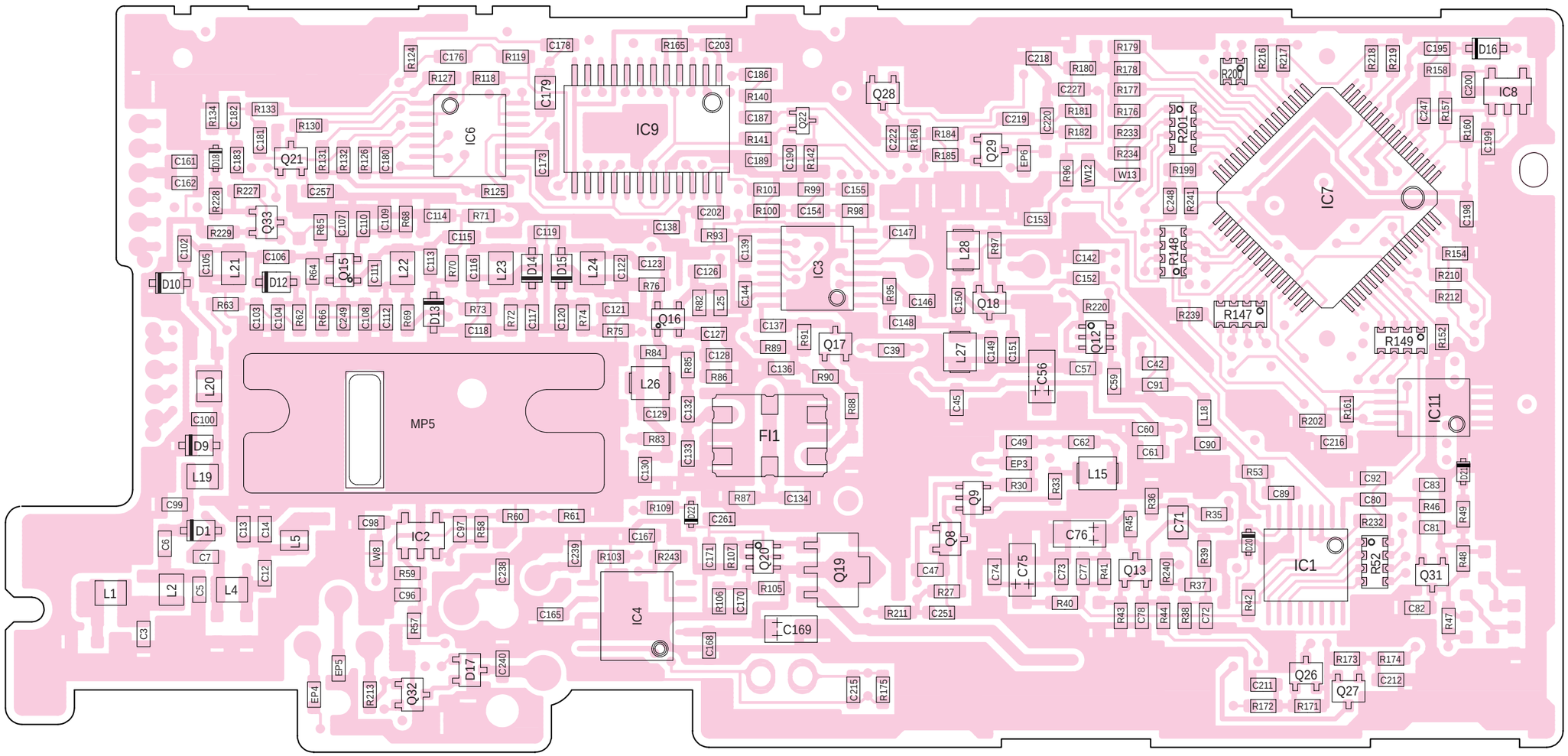

IC6
IC9
IC3
IC7
IC8
IC11
IC1
IC2
IC4
MP5
FI1
Q28
Q29
Q18
Q17
Q16
Q15
Q33
Q21
Q12
Q13
Q9
Q8
Q19
Q20
Q32
Q26
Q27
Q31
L15
L26
L27
L28
L20
L19
L1
L2
L4
L5
L21
L22
L23
L24
C179
C56
C75
C76
C71
C169
D10
D12
D13
D14
D15
D16
D17
D18
D1
D9
R200
R201
R148
R147
R149
R52
R202
C216
C211
C212
R172
R171
R173
R174

9-2 IC-F21/F21S/F21BR/F21GM MAIN UNIT

• **TOP VIEW**



• **BOTTOM VIEW**


IC6
IC9
Q28
Q22
C178
C179
R165
C203
R124
C176
R119
R127
R118
C186
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C141
C189
C190
R142
C218
R180
C227
R179
R178
R177
R176
R233
R234
R96
W12
W13
C219
C220
R181
R182
R184
R185
C222
R186
Q29
EP6
R201
R200
R216
R217
R218
R219
C195
D16
R158
C200
IC8
C247
R157
R160
C199
C198
IC7
R199
C248
R241
C153
C147
L28
R97
C142
C152
R220
R239
R147
R148
R154
R210
R212
R149
R152
Q12
C57
C42
C91
C59
C56
C45
L27
C149
C151
Q18
C146
C150
R95
C148
C39
Q17
R91
R89
C137
C136
R90
R88
C127
C128
R86
R84
R85
L26
C129
C132
C133
C130
R83
FI1
R87
C134
R109
D22
C261
C167
R103
R243
C239
C238
C171
R107
Q20
R105
R106
C170
C165
IC4
C168
C169
Q19
R211
C251
C47
R27
C74
C75
C76
C73
C77
R41
Q13
R240
R40
R43
C78
R44
R38
C72
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R45
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C89
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IC1
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Q8
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R213
Q32
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C97
R58
R60
R61
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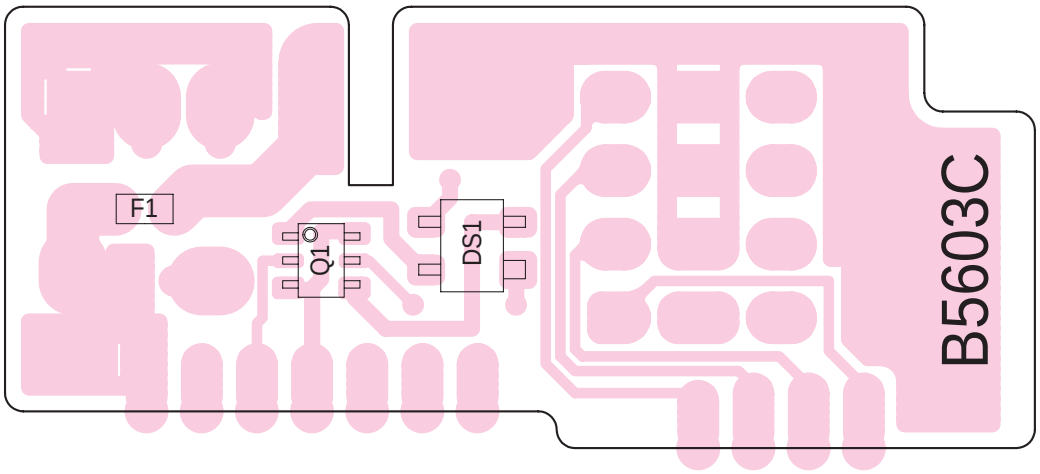
C6
C7
C13
C14
L5
C12
L1
L2
C5
L4
C3
L20
C100
D9
L19
MP5
C161
C162
D18
C183
C181
R134
C182
R133
R130
Q21
R131
R132
R126
C180
R228
R227
C257
R125
R229
Q33
R65
C107
C110
C109
R68
C114
R71
C115
C102
C105
L21
C106
D10
D12
R64
Q15
C111
L22
C113
R70
C116
L23
D14
D15
L24
C122
C119
C138
R93
C139
C123
C126
R76
R82
L25
C144
R73
C118
R72
C117
C120
R74
C121
R75
Q16
R63
C103
C104
R62
R66
C249
C108
C112
R69
D13

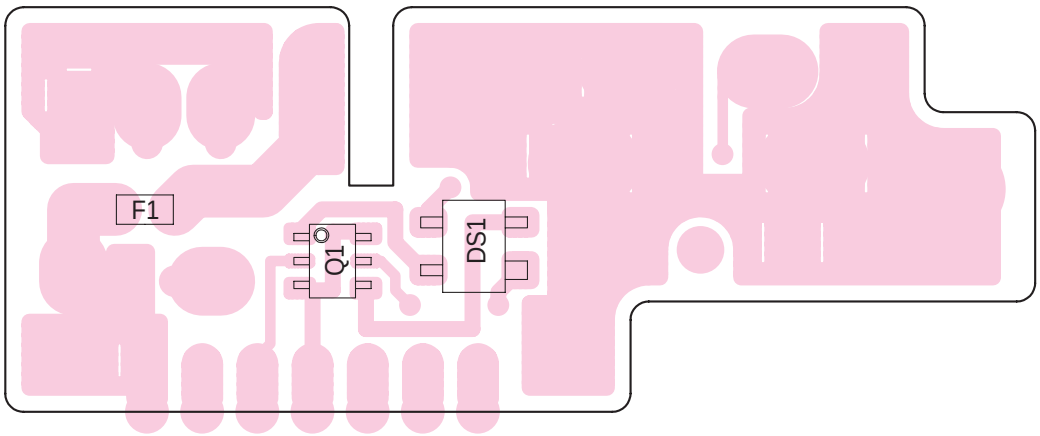
9-3 SW-A AND SW-B UNITS

- **TOP VIEW**

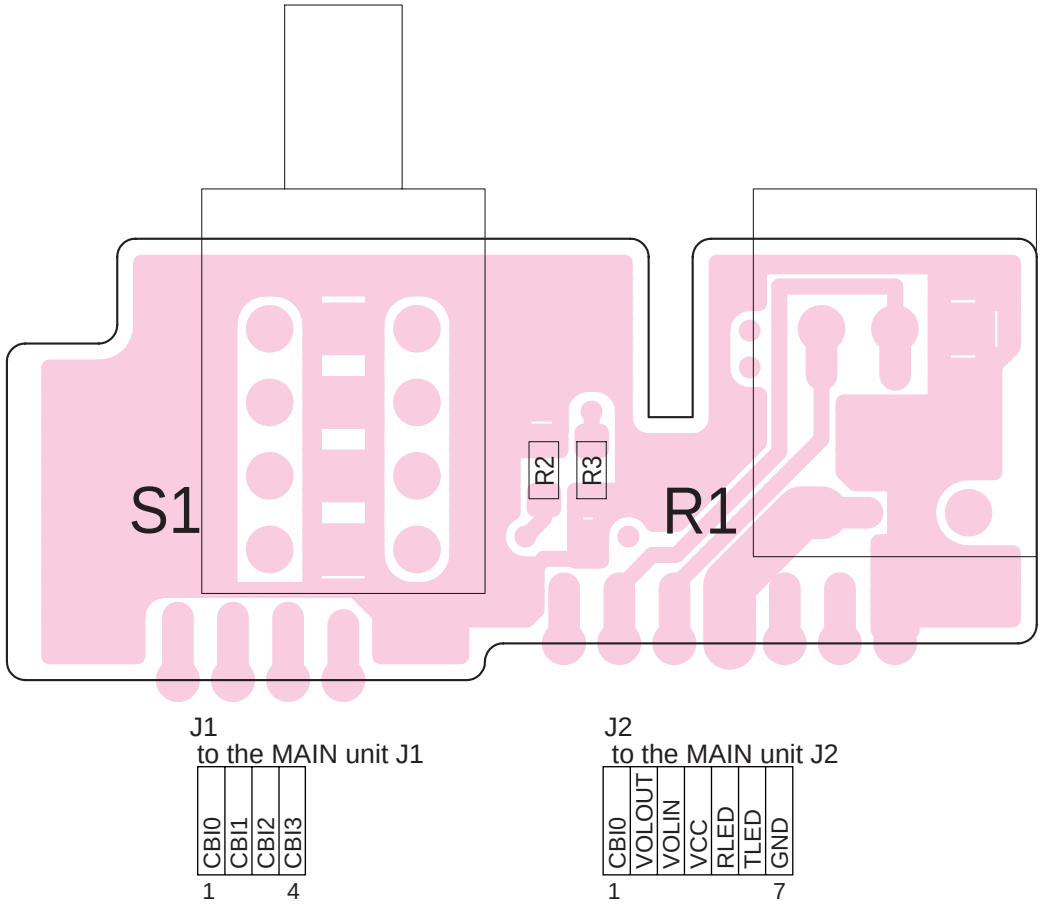
SW-A UNIT



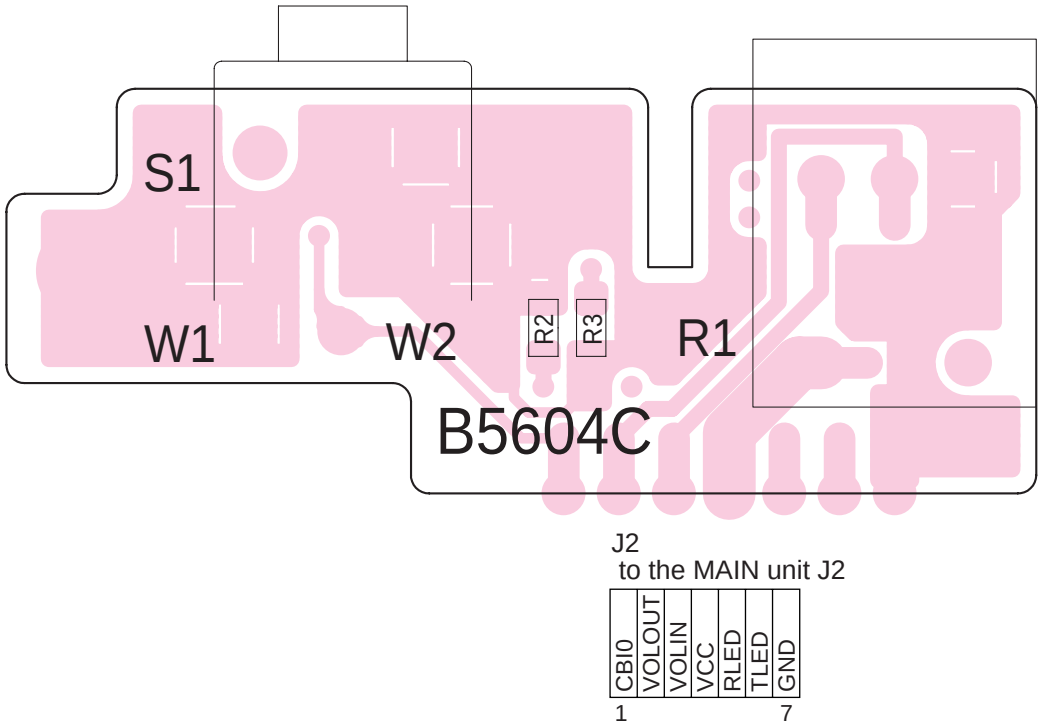
SW-B UNIT



• **BOTTOM VIEW**
SW-A UNIT



SW-B UNIT



SECTION 10 BC-146 OPTIONAL DESKTOP CHARGER INFORMATION

10-1 PARTS LIST

[CHARGE UNIT]

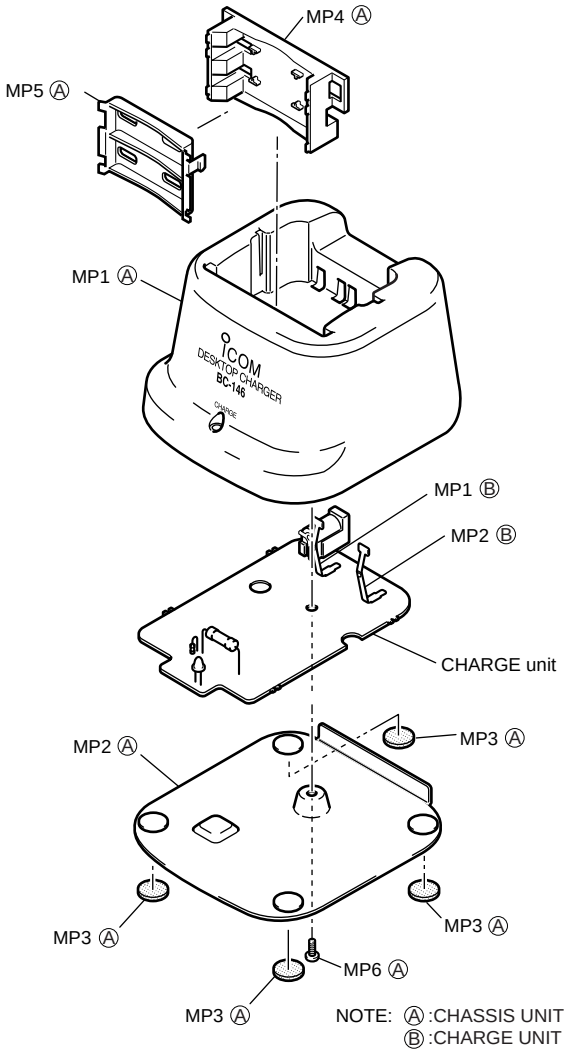
REF. NO.	ODER NO.	DESCRIPTION		QTY.
R1	7010007550	RESISTOR	ERG3SJ680H	1
R2	7010007100	RESISTOR	PSD1/4V 1 kΩ	1
J1	6510021470	CONNECTOR	HEC0470-01-230	1
DS1	5040001390	LED	TLG124A	1
EP1	0910053820	PCB	B 5650	1
MP1	8930051340	2338 TERMINAL		1
MP2	8930051340	2338 TERMINAL		1

[CHASSIS UNIT]

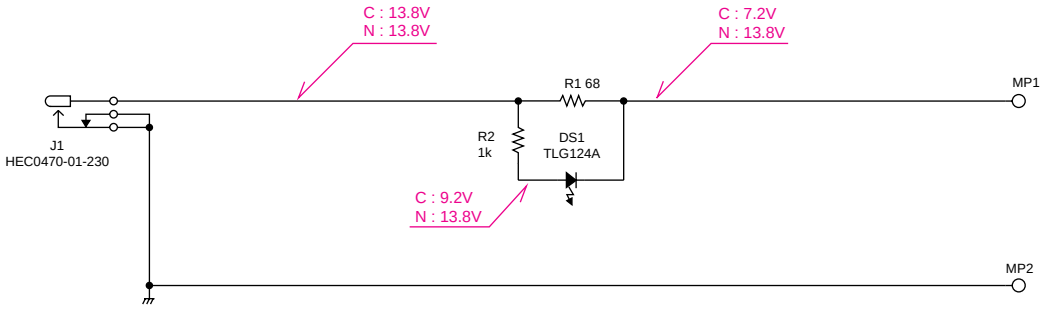
REF. NO.	ODER NO.	DESCRIPTION	QTY.
MP1	8010018620	2447 case (A)	1
MP2	8110007450	2447 cover	1
MP3	8930039620	Leg cushion (A)	4
MP4	8930055020	2480 spacer	1
MP5	8930055030	2480 BC-spacer	1
MP6	8810008660	Screw B0 M 3 x 8 NI-ZU (BT)	1

Screw abbreviations B0, BT:Self-tapping
NI-ZU :Nickel-Zinc

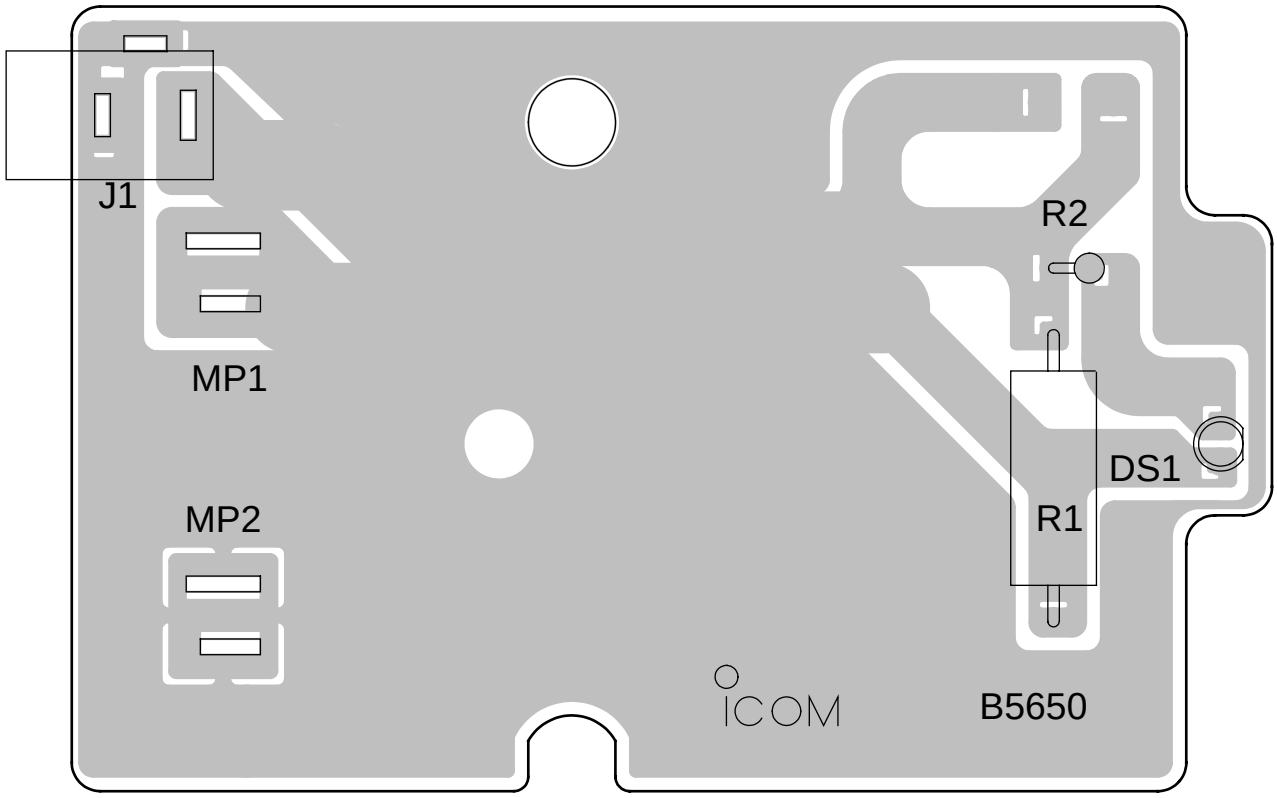
10-2 DISASSEMBLY INFORMATION



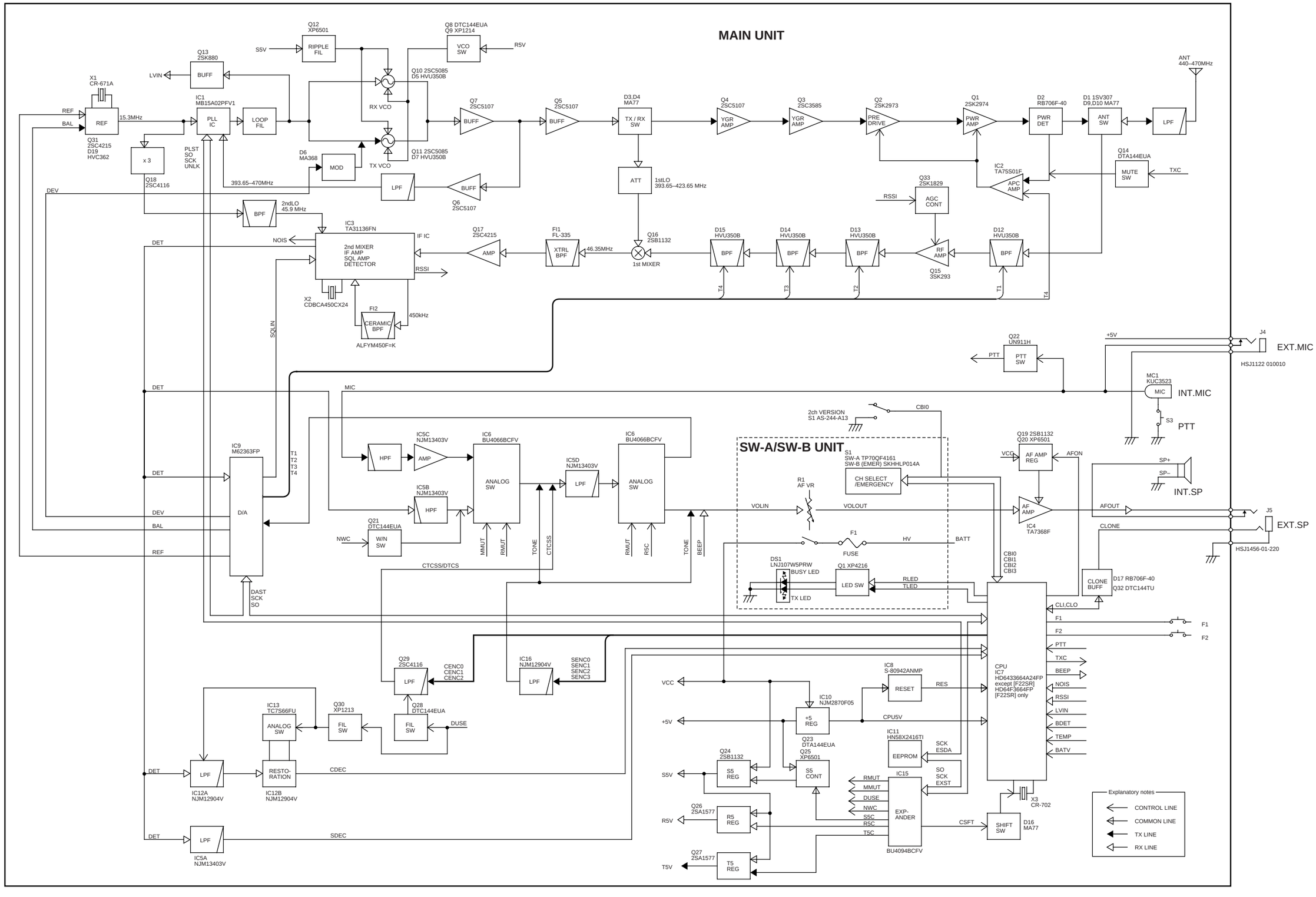
10-3 VOLTAGE DIAGRAM



10-4 BOARD LAYOUT

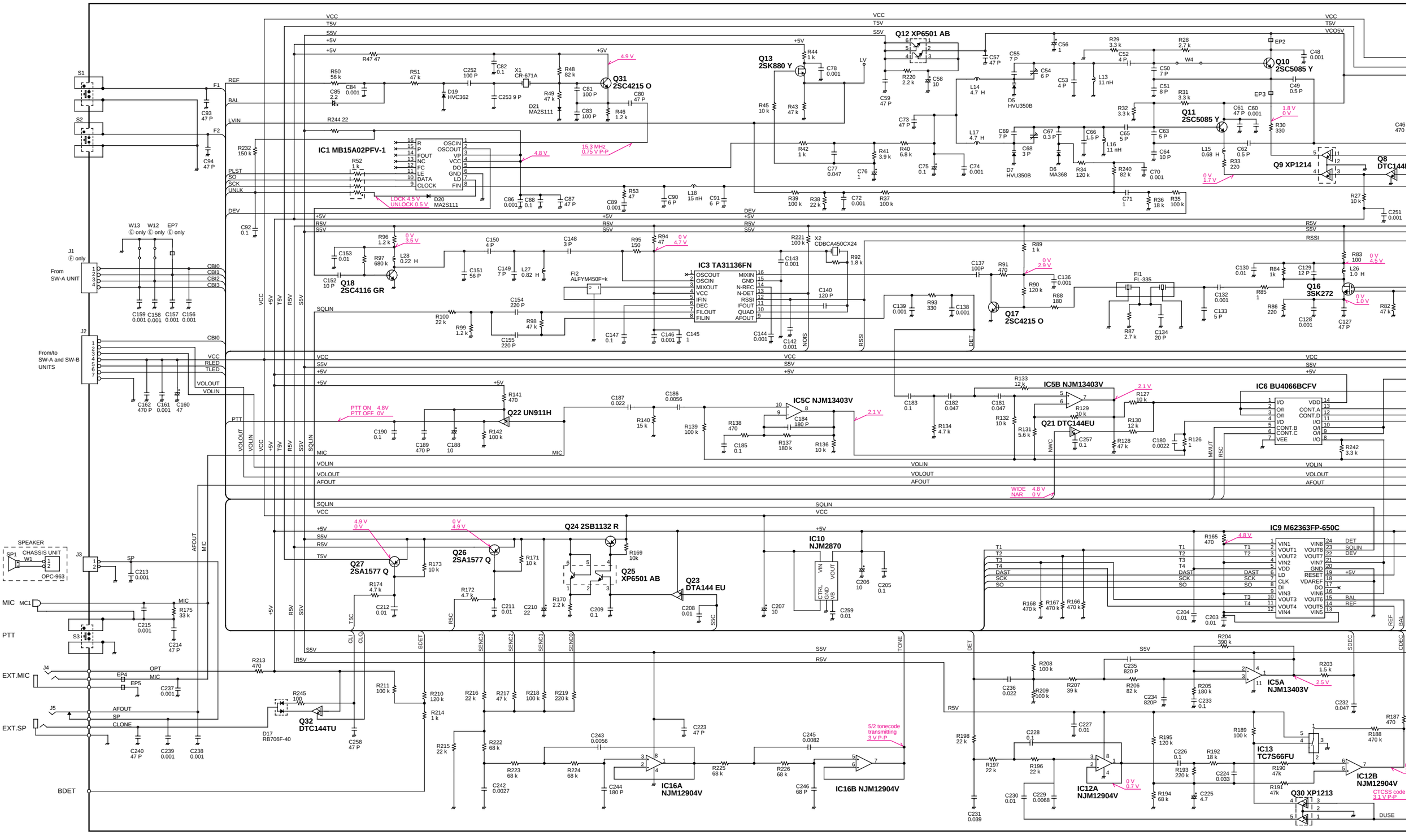


SECTION 11 BLOCK DIAGRAM

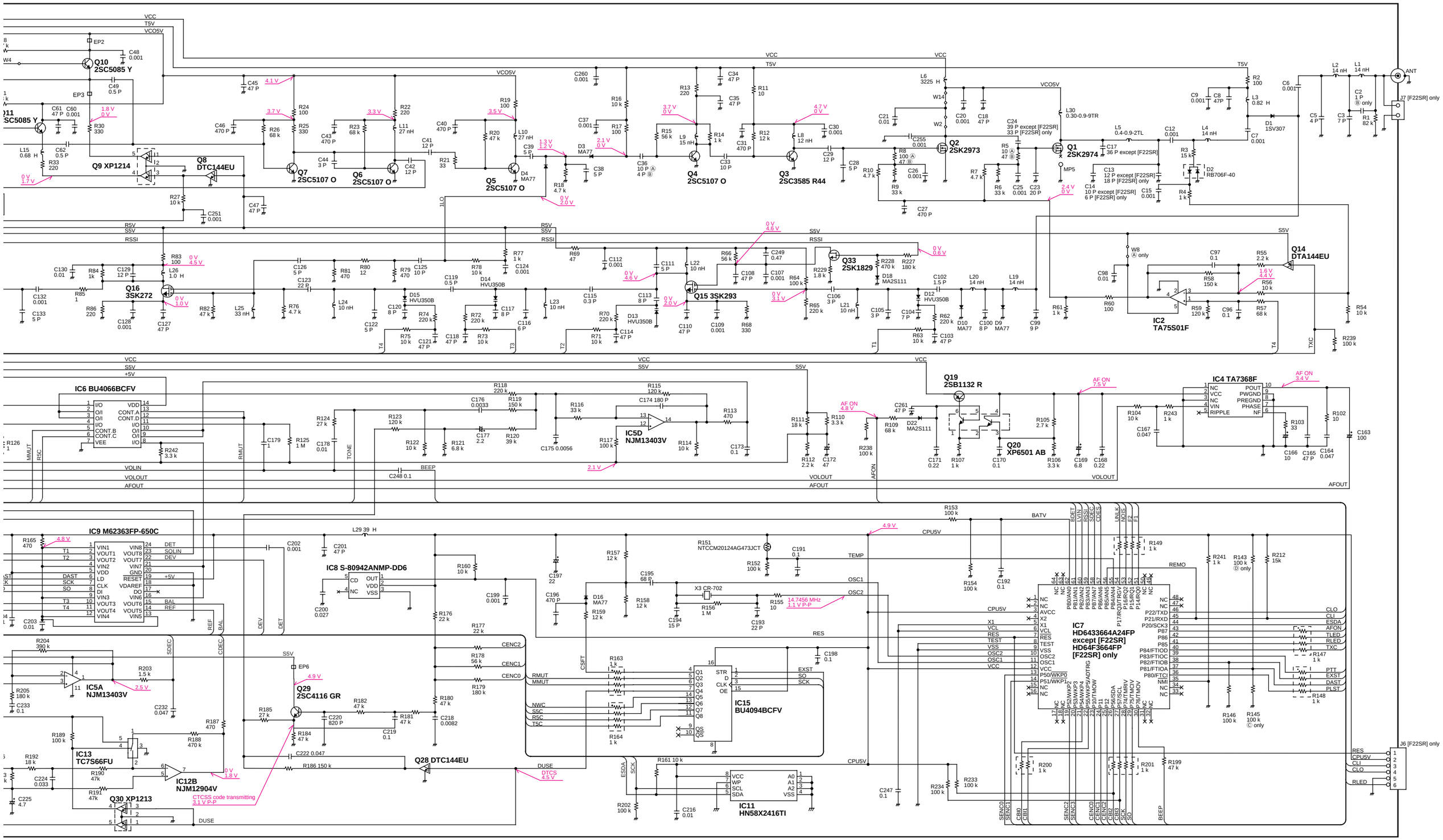


SECTION 12 VOLTAGE DIAGRAM

NOTE: Ⓐ: [F21], [F21BR], [F21GM] and [F21S]
Ⓑ: [F22], [F22S] and [F22SR]
Ⓒ: [F21BR], [F21GM] and [F22SR]
Ⓓ: [F21], [F21S], [F22] and [F22S]
Ⓔ: [F21BR], [F21S] and [F22S]
Ⓕ: [F21GM], [F21], [F22] and [F22SR]

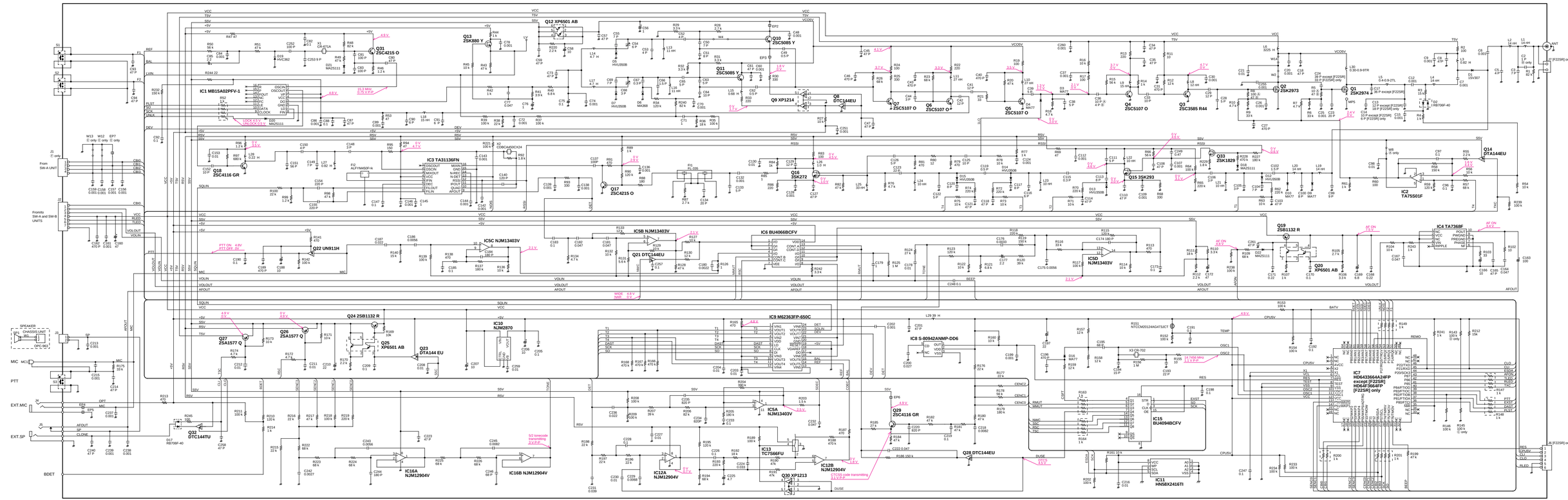


:21GM] and [F22SR]
=21], [F22] and [F22SR]



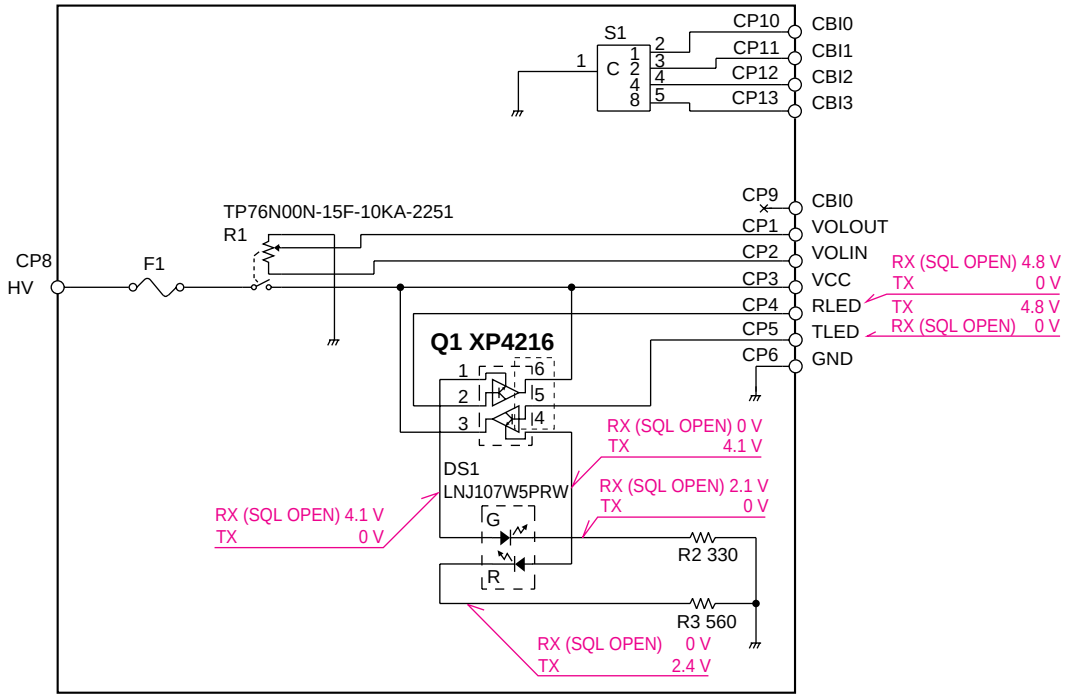
SECTION 12 VOLTAGE DIAGRAM

NOTE: Ⓐ: [F21], [F21BR], [F21GM] and [F21S] Ⓑ: [F22], [F22S] and [F22SR] Ⓒ: [F21BR], [F21GM] and [F22SR]
Ⓓ: [F21], [F21S], [F22] and [F22S] Ⓔ: [F21BR], [F21S] and [F22S] Ⓕ: [F21GM], [F21], [F22] and [F22SR]

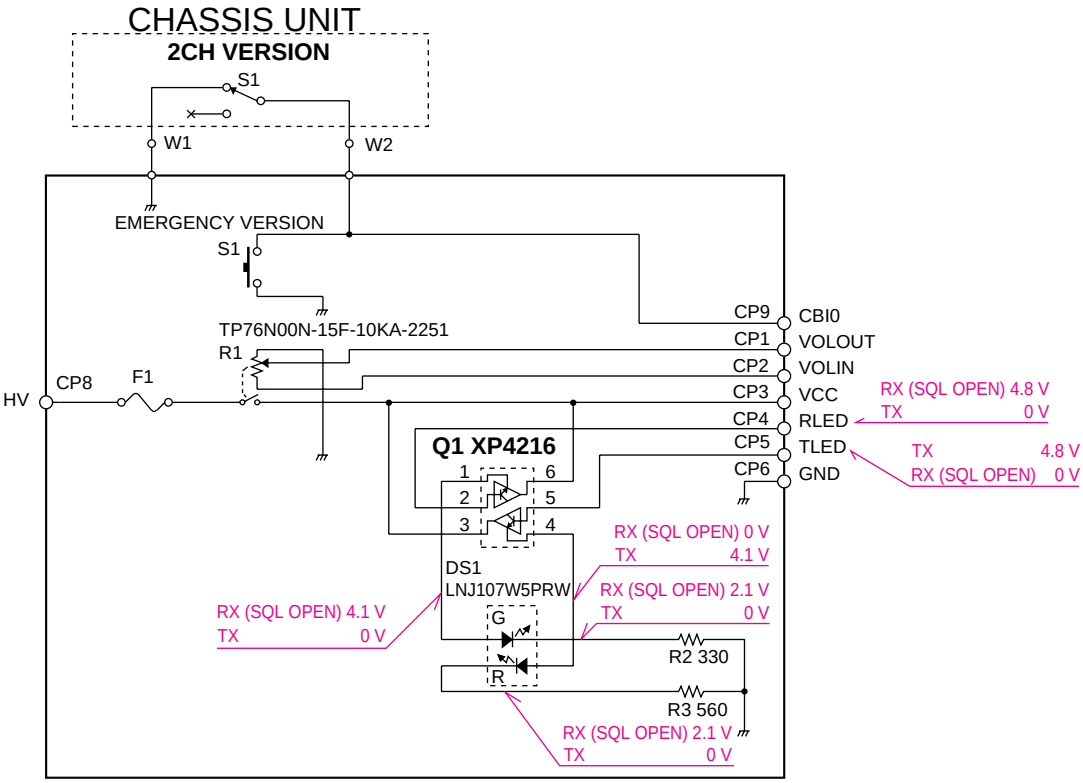


12-2 SW-A AND SW-B UNITS

- **SW-A UNIT**



- **SW-B UNIT**



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